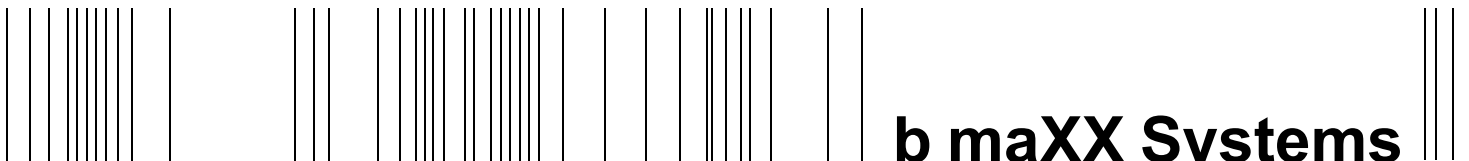


be in motion be in motion



b maXX Systems

b maXX controller PLC

Operating Instructions

E

5.04014.04



Title	Operating Instructions
Product	b maXX controller PLC BMC-M-PLC-01/-02
Last Revision:	26 February 2007
Copyright	<p>Owners may make as many copies as they like of these Operating Instructions exclusively for their own internal use. You are not allowed to copy or duplicate even extracts from these Operating Instructions for any other purposes. You are not permitted to exploit or communicate the contents of these Operating Instructions.</p> <p>Any other designations or company logos used in these Operating Instructions may be trademarks whose use by third parties for their own purposes may affect the rights of the owner of the trademark.</p>
Binding nature	<p>These Operating Instructions are a part of the unit/machine. These Operating Instructions must always be available to operators and be legible. If the unit/machine is sold, the owner must pass on these Operating Instructions together with the unit/machine.</p> <p>After selling the unit/machine you must pass on this original and all the copies that you made to the purchaser. After disposing of the machine in any way, you must destroy this original and all the copies that you made.</p> <p>When you pass on these Operating Instructions, all earlier revisions of the corresponding Parameter Manual are invalidated.</p> <p>Note that all the data/numbers/information that are quoted are current values at the time of printing. This information is not legally binding for dimensioning, calculation and costing.</p> <p>Within the scope of further-development of our products, Baumüller Nürnberg GmbH reserve the right to change the technical data and handling.</p> <p>We cannot guarantee these Operating Instructions are completely error-free unless this is expressly indicated in our General Conditions of Business and Delivery.</p>
Manufacturer	<p>Baumüller Nürnberg GmbH Ostendstr. 80 - 90 90482 Nuremberg Germany Tel. +49 9 11 54 32 - 0 Fax: +49 9 11 54 32 - 1 30 www.baumueller.de</p>



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1

INTRODUCTION

These operating instructions are an important component of your b maXX system; this means that you must thoroughly read this document, not least to ensure your own safety.

In this chapter, we will describe the first steps that you should carry out after getting this unit. We will define terms that are used in this documentation on a consistent basis and will inform you about the responsibilities you must consider when using this unit.

For more detailed information on operating and deploying the module, refer to the documentation entitled "b maXX controller PLC Application Manual".

1.1 First Steps

- ▶ Check the shipment see [▶Packaging and transportation◀](#) from page 15 onward.
- ▶ Pass on all the documentation that was supplied with the module to the appropriate departments in your company.
- ▶ Deploy suitable personnel for assembly and commissioning.
- ▶ Pass on these operating instructions to this personnel and ensure that they have read and understood the safety instructions and that they are following them.

1.2 Terms Used

In this documentation, we will also refer to Baumüller's "**b maXX controller PLC**" product as "PLC", or "BMC-M-PLC-01" and „BMC-M-PLC-02“ respectively.

In this documentation, we will also refer to the product „Power supply unit for b maXX controller PLC“ as „module“ or „power supply unit“.

We will also use the term "b maXX system" for a product consisting of „Power supply unit“, „b maXX controller PLC“ and more components.

For a list of the abbreviations that are used, refer to [▶ Appendix A - Abbreviations ◀](#) from page 71 onward.

BASIC SAFETY INSTRUCTIONS

We have designed and manufactured each Baumüller module in accordance with the strictest safety regulations. Despite this, working with the module can be dangerous for you.

In this chapter, we will describe the risks that can occur when working with a Baumüller module. Risks are illustrated by icons. All the symbols that are used in this documentation are listed and explained.

In this chapter, we cannot explain how you can protect yourself from specific risks in individual cases. This chapter contains only general protective measures. We will go into concrete protective measures in subsequent chapters directly after information about the individual risk.

2.1 Hazard information and instructions



Hazard information will show you the dangers, that can lead to injuries or even to death. Always follow the hazard information given in this document.

Hazards are always divided into three danger classifications. Each danger classification is identified by one of the following words:

DANGER

- Considerable damage to property
- Serious personal injury
- Death **will** occur

WARNING

- Considerable damage to property
- Serious personal injury
- Death **can** occur

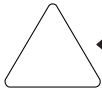
CAUTION

- Damage to property
- Slight to medium personal injury **can** occur

2.1 Hazard information and instructions

2.1.1 Structure of hazard information

The following two examples show how hazard information is structured in principle. A triangle is used to warn you about danger to living things. If there is no triangle, the hazard information refers exclusively to damage to property.



A triangle indicates that there is danger to living things. The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is.



The icon in the rectangle represents the hazard. The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is.



The icon in the circle represents an instruction. Users must follow this instruction. (The circle is shown dashed, since an instruction is not available as an icon for each hazard advisory).



The circle shows that there is a risk of damage to property.



The icon in the rectangle represents the hazard. The color of the border shows how severe the hazard is: the darker the color, the more severe the hazard is. (The rectangle is shown dashed, since the danger is not represented as an icon with every hazard advisory)

The text next to the icons is structured as follows:

THE SIGNAL WORD IS HERE THAT SHOWS THE DEGREE OF RISK




Here we indicate whether one or more of the results below occurs if you do not observe this warning.


- Here, we describe the possible results. The worst result is always at the extreme right.

Here, we describe the hazard.

Here, we describe what you can do to avoid the hazard.


2.1.2 Hazard advisories that are used

If a signal word is preceded by one of the following danger signs:  or  or , the safety information refers to injury to people.

If a signal word is preceded by a round danger sign: , the safety information refers to damage to property.

2.1.2.1 Hazard advisories about injuries to people

To be able to differentiate visually, we use a separate border for each class of hazard information with the triangular and rectangular pictograms.

For danger classification **DANGER**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



DANGER




The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **mechanical effects**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



For danger classification **WARNING**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

WARNING




The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

*Danger from: **electricity**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



For danger classification **CAUTION**, we use the  danger sign. The following hazard information of this danger classification is used in this documentation.

2.1 Hazard information and instructions



CAUTION

The following **may occur**, if you do not observe this caution information:

- minor to medium personal injury.

*Danger from: **sharp edges**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



CAUTION

The following **may occur**, if you do not observe this danger information:

- environmental pollution.

*Danger from: **incorrect disposal**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



2.1.2.2 Hazard advisories about damage to property

If a signal word is preceded by a round danger sign: ⓘ, the safety information refers to damage to property.



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

*Danger from: **electrostatic discharge**. The hazard may be described in more detail here.*

Here, we describe what you can do to avoid the hazard.



2.1.2.3 Instruction signs that are used



wear safety gloves



wear safety shoes

2.2 Information signs



NOTE

This indicates particularly important information.

2.3 Legal information

This documentation is intended for technically qualified personnel that has been specially trained and is completely familiar with all warnings and maintenance measures.

The equipment is manufactured to the state of the art and is safe in operation. It can be put into operation and function without problems if you ensure that the information in the documentation is complied with.

Operators are responsible for carrying out servicing and commissioning in accordance with the safety regulations, applicable standards and any and all other relevant national or local regulations with regard to cable rating and protection, grounding, isolators, over-current protection, etc.

Operators are legally responsible for any damage that occurs during assembly or connection.

2.4 Appropriate Use

You must always use the module appropriately. Some important information is listed below. The information below should give you an idea of what is meant by appropriate use of the module. The information below has no claim to being complete; always observe all the information that is given in these operating instructions.

- You must only add on the module to a power supply unit for b maXX controller PLC.
- Configure the application such that the module is always operating within its specifications.
- Ensure that only qualified personnel works with this module.
- Mount the module only on a power supply unit for b maXX controller PLC.
- Install the module as specified in this documentation.
- Ensure that connections always comply with the stipulated specifications.
- Operate the module only when it is in technically perfect condition.
- Always operate the module in an environment that is specified in the technical data.
- Always operate the module in a standard condition.
For safety reasons, you must not make any changes to the module.
- Observe all the information on this topic if you intend to store the module.

You will be using the module in an appropriate way if you observe all the comments and information in these operating instructions.

2.5 Inappropriate Use

Below, we will list some examples of inappropriate use. The information below should give you an idea of what is meant by inappropriate use of the module. We cannot, however, list all possible cases of inappropriate use here. Any and all applications in which you ignore the information in this documentation are inappropriate; particularly, in the following cases:

- You added the module on an other unit/module as the power supply unit for b maXX controller PLC.
- You ignored information in these operating instructions.
- You did not use the module as intended.
- You handled the module as follows
 - you mounted it incorrectly,
 - you connected it incorrectly,
 - you commissioned it incorrectly,
 - you operated it incorrectly,
 - you allowed non-qualified or insufficiently qualified personnel to mount the module, commission it and operate it,
 - you overloaded it,
 - You operated the module
 - with defective safety devices,
 - with incorrectly mounted guards or without guards at all,
 - with non-functional safety devices and guards
 - outside the specified environmental operating conditions
- You modified the module without written permission from Baumüller Nürnberg GmbH.
- You ignored the maintenance instructions in the component descriptions.
- You incorrectly combined the module with third-party products.
- You combined the b maXX system with faulty and/or incorrectly documented third-party products.
- Your self-written PLC software contains programming errors that lead to a malfunction.

Version 1.1 of Baumüller Nürnberg GmbH's General Conditions of Sale and Conditions of Delivery dated 2/15/02 or the respective latest version applies in all cases. These will have been available to you since the conclusion of the contract at the latest.

2.6 Protective equipment

In transit, the modules are protected by their packaging. Do not remove the module from its packaging until just before you intend to mount it.

The housing of the module provides IP20 protection to the modules from dirt and damage due to static discharges from contact. This means that you never use a module with damaged housing.

2.7 Personnel training



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

Only qualified personnel are allowed to mount, install, operate and maintain equipment made by Baumüller Nürnberg GmbH.

Qualified personnel (specialists) are defined as follows:

Qualified Personnel Electrical engineers and electricians of the customer or of third parties who are authorized by Baumüller Nürnberg GmbH and who have been trained in installing and commissioning Baumüller b maXX systems and who are authorized to commission, ground and mark circuits and equipment in accordance with recognized safety standards.

Qualified personnel has been trained or instructed in accordance with recognized safety standards in the care and use of appropriate safety equipment.

Requirements of the operating staff The b maXX system may only be operated by persons who have been trained and are authorized.

Only trained personnel are allowed to eliminate disturbances, carry out preventive maintenance, cleaning, maintenance and to replace parts. These persons must be familiar with the Operating Instructions and act in accordance with them.

Commissioning and instruction must only be carried out by qualified personnel.

2.8 Safety measures in normal operation

- ▶ At the b maXX systems' place of installation, observe the applicable safety regulations for the plant in which this unit is installed.
- ▶ Provide the b maXX system with additional monitoring and protective equipment if the safety regulations demand this.
- ▶ Observe the safety measures for the unit in which the module is installed.

2.9 Responsibility and liability

To be able to work with this module in accordance with the safety requirements, you must be familiar with and observe the hazard information and safety instructions in this documentation.

2.9.1 Observing the hazard information and safety instructions

In these operating instructions, we use visually consistent safety instructions that are intended to prevent injury to people or damage to property.



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

Any and all persons who work on and with Series b maXX units must always have available these Operating Instructions and must observe the instructions and information they contain – this applies in particular to the safety instructions.

Apart from this, any and all persons who work on this unit must be familiar with and observe all the rules and regulations that apply at the place of use.

2.9.2 Danger arising from using this module

The b maXX controller PLC has been developed and manufactured to the state of the art and complies with applicable guidelines and standards. It is still possible that hazards can arise during use. For an overview of possible hazards, refer to the chapter entitled [▶Basic Safety Instructions](#) ◀ from page 7 onward.

We will also warn you of acute hazards at the appropriate locations in this documentation.

2.9.3 Warranty and Liability

All the information in this documentation is non-binding customer information; it is subject to ongoing further development and is updated on a continuous basis by our permanent change management system.

Warranty and liability claims against Baumüller Nürnberg GmbH are excluded; this applies in particular if one or more of the causes listed in [▶Inappropriate Use](#) ◀ from page 12 onward or below caused the fault:

- Disaster due to the influence of foreign bodies or force majeure.

PACKAGING AND TRANSPORTATION

We package every Baumüller unit before shipping such that it is highly unlikely that it will be damaged in transit.

3.1 Transportation

The modules are packed at the factory in accordance with the order.

- ▶ Avoid severe vibrations and jolts (max. 1 g) in transit.
- ▶ Avoid static discharges to the modules' electronic components.
- ▶ Do not remove the module from its protective packaging until just before you intend to mount it.

3.2 Unpacking

After receiving the module while it is still packaged:

- ▶ Check whether there is any visible damage!

If there is:

- ▶ Complain to the delivery company. Have your complaint confirmed in writing and contact immediately your nearest Baumüller Nürnberg GmbH subsidiary.

CAUTION



The following **may occur**, if you do not observe this caution information:

- property damage.



*Danger from: **electrostatic discharge**. If you touch the plug-in module, and especially its electronic components, and subject them to electrostatic discharges, the module can be damaged or even totally destroyed.*

When handling the plug-in module, always observe the regulations and information on handling electrostatically sensitive components.

3.3 Disposing of the packaging

If no damage is visible:

- ▶ Open the unit's packaging.
- ▶ Check the scope of supply against the delivery note.

The scope of supply is:

- **b maXX controller PLC**
- these Operating Instructions including the declaration of conformity/manufacturer declaration
- ▶ complain to your local Baumüller subsidiary if you find damage or if the delivery is not complete.

3.3 Disposing of the packaging

The packaging consists of cardboard and plastic.

- ▶ Observe local disposal regulations if you intend to dispose of the packaging.

3.4 Observe during transportation

The module was packaged at the manufacturer's plant for initial transportation. If you have to transport the module at a later date, please note the following points:

- ▶ Use the original packaging material
- or
- ▶ Use packaging that is suitable for electrostatic sensitive devices.

Ensure that the transport conditions (see [▶ Appendix D Technical Data](#) from page 79 onward) always apply during transportation.

DESCRIPTION OF THE B MAXX CONTROLLER PLC MODULE

In this chapter, we will describe the b maXX controller PLC module and explain the type code on the module.

4.1 General

The b maXX controller PLC is a PLC for implementing distributed automation technology.

The b maXX controller PLC and more connected system components help to implement the functionality of a distributed PLC, e.g. configurable control engineering, digital and analog inputs and outputs, links to different bus systems, open- and closed-loop control of distributed drives (e.g. cam disk) via the bus systems (e.g. CANopen).

You can link HMIs like operator panels, touchscreens, etc. via the integrated RS485 port by means of a software interface module to the 3964R[®] procedure (data block link). As an alternative, you can operate this interface via a software interface module to the USS protocol[®], with the b maXX controller PLC functioning as the master that can activate several USS protocol[®]-capable slaves.

The 3964R[®] procedure and the USS protocol[®] are registered trademarks of Siemens AG.

NOTE



The software interface module to the USS protocol[®] is available for BMC-M-PLC-01 only.

You carry out open- and closed-loop programming via the standard RS232 port on the b maXX controller PLC.

- System components** It is possible to extend the range of functions of the b maXX controller PLC with system components. The following system components are available, for example:
- CANopen-Master
 - EtherCAT-Master
 - Ethernet interface module
 - Ethernet interface module with CANopen-Master
 - Digital and analog inputs and outputs
- IEC 61131-3 programming languages** You carry out open- and closed-loop programming in a modular way using Version 3.0 and above of the PROPROG wt II programming environment or Version 1.1 and above of the ProProg wt III programming environment in the following programming languages:
- Sequential Function Chart SFC,
 - Structured text, ST
 - Statement List, STL
 - Control System Flowchart, CSF
 - Ladder Diagram, LAD
- Technology functions** Apart from this, you can implement use libraries to implement intelligent technological functions, like:
- Cam disk
 - Winder
- In addition to the PROPROG IEC 61131-3 programming environment, you can integrate into the global machine concept an OPC server for linking visualization tasks and parameterizations via OPC clients.

4.2 Structure

4.2.1 BMC-M-PLC-01

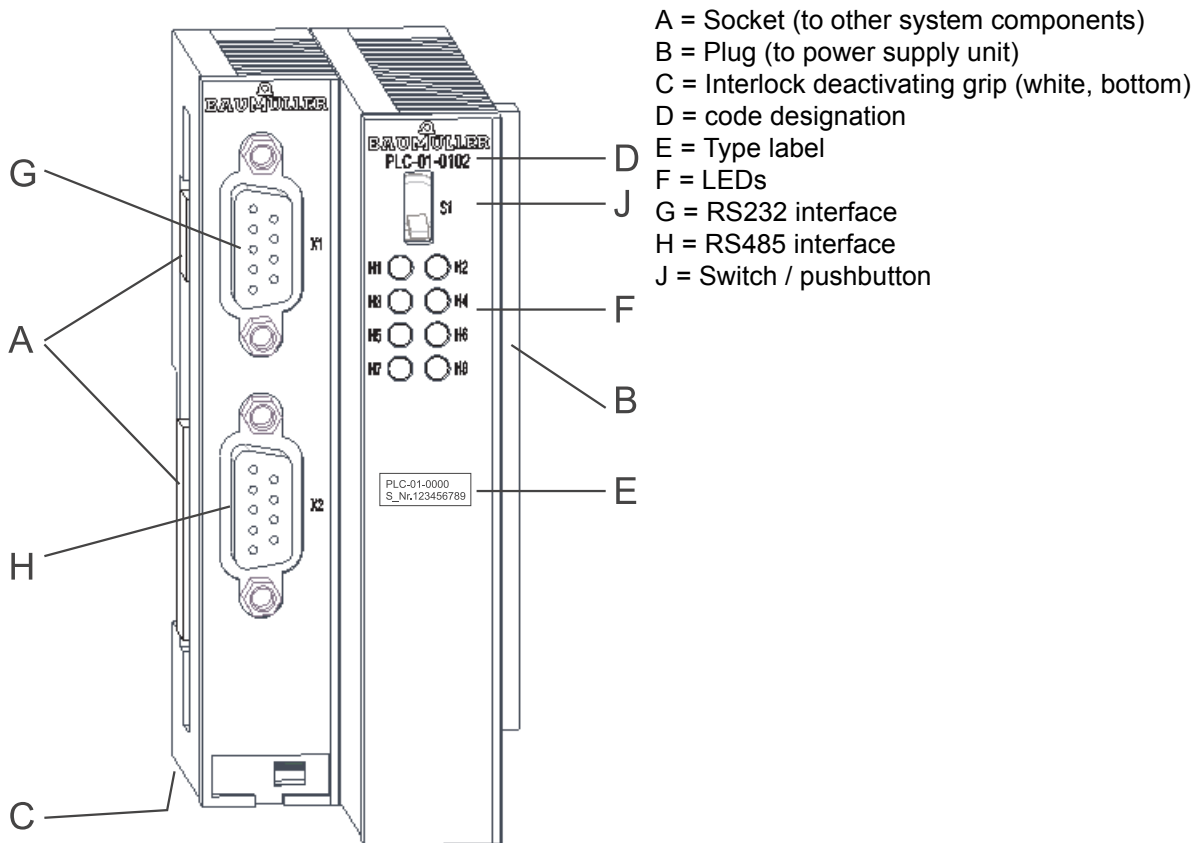


Figure 1: b maXX controller PLC-01

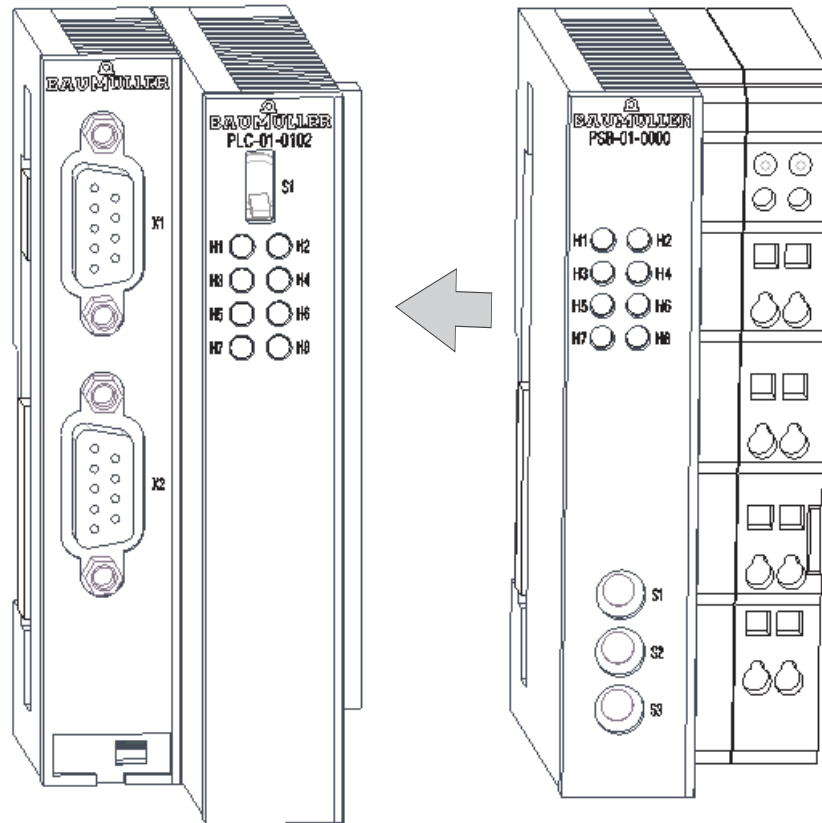


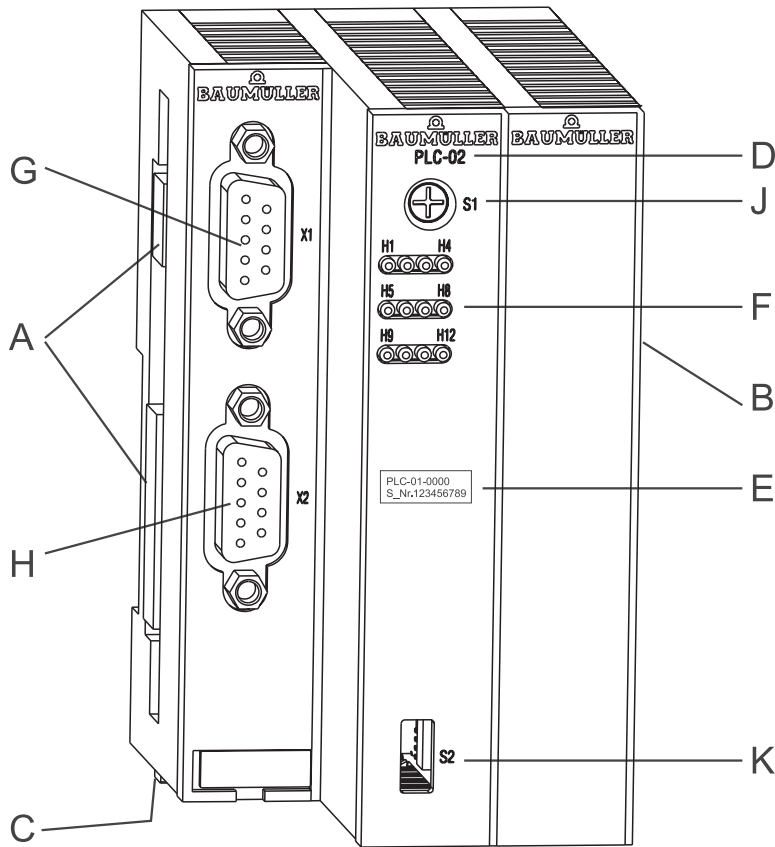
Figure 2: b maXX controller PLC-01 with power supply unit



NOTE

If you doesn't plug the b maXX controller PLC to the power supply unit, the b maXX system does not function.

4.2.2 BMC-M-PLC-02



- A = Socket (to other system components)
- B = Plug (to power supply unit)
- C = Interlock deactivating grip (white, bottom)
- D = code designation
- E = Type label
- F = LEDs
- G = RS232 interface
- H = RS485 interface
- J = Rotary switch
- K = Switch / pushbutton

Figure 3: b maXX controller PLC-02

4.3 Functionality

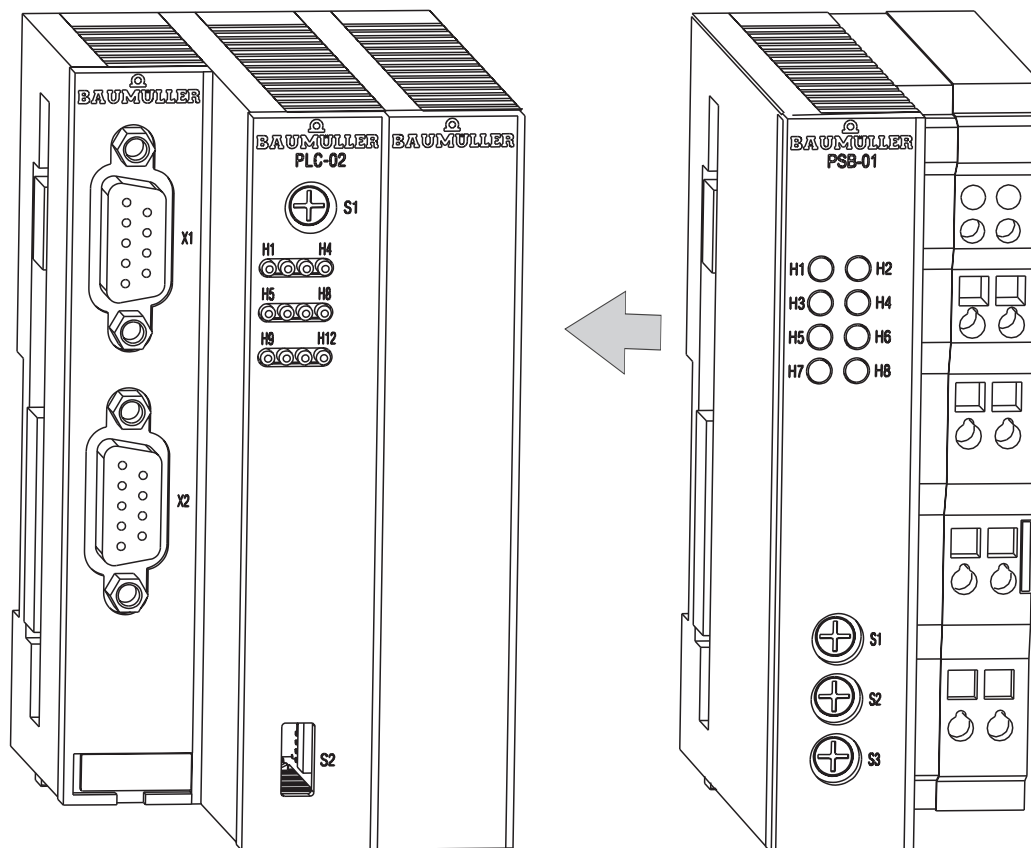


Figure 4: b maXX controller PLC-02 with power supply unit

4.3 Functionality

4.3.1 BMC-M-PLC-01

- 120 MHz 32-bit RISC-CPU
- 1 MB of program memory (Flash, 16 bit data width) for saving the boot project
- 2046 kB of program memory (SDRAM, 32 bit data width) for executable statements
 - A maximum of 400,000 STL lines (LD/ST statements to global variables)
 - Typically 120,000 STL lines (typical STL statements to structures and instance variables)
- 1460 kB of dynamic memory for debug and logic analyzer functions
- 4 MB of Flash-NOVRAM for retentive flags
- 2 MB of SDRAM for non-retentive flags
- Cycle time of approximately 100 μ s per 1000 lines of statement list (STL)
- RS232 serial programming port of the b maXX controller PLC, optically decoupled
- RS485 serial terminal port of the b maXX controller PLC, optically decoupled
- Up to five addressable modules (system components)
 - Several EtherCAT-Master
 - Several CANopen-Master modules

- Several Ethernet-interface modules
- Several Ethernet-interface modules with CANopen-Master
- Motion Control support
- Power consumption approximately 2,5 W

4.3.2 BMC-M-PLC-02

- 667 MHz 32-bit RISC-CPU
- 16 MB of program memory (Flash, 16 bit data width) for saving the boot project
- 16 MB of program memory (SDRAM, 32 bit data width) for executable statements
 - A maximum of 2,000,000 STL lines (LD/ST statements to global variables)
 - Typically 600,000 STL lines (typical STL statements to structures and instance variables)
- Approx. 9 MB of dynamic memory for debug and logic analyzer functions
- 100 kB of NOVRAM for retentive flags
- 32 MB FDisk memory (to store cams and configuration data)
- 2 MB (set as limit in the ProProg project template for BMC-M-PLC-02) of data memory (SDRAM), extendable up to approx. 9 MB.
- Cycle time of approximately 25 μ s per 1000 lines of statement list (STL)
- RS232 serial programming port of the b maXX controller PLC, optically decoupled
- RS485 serial terminal port of the b maXX controller PLC, optically decoupled
- Up to five addressable modules (system components)
 - Several EtherCAT-Master
 - Several CANopen-Master modules
 - Several Ethernet-interface modules
 - Several Ethernet-interface modules with CANopen-Master
- Motion Control support
- Power consumption approximately 5 W

4.4 Danger zones

The illustration below gives you an overview of the danger zones in the module.

4.5 Labeling of the controller – type code

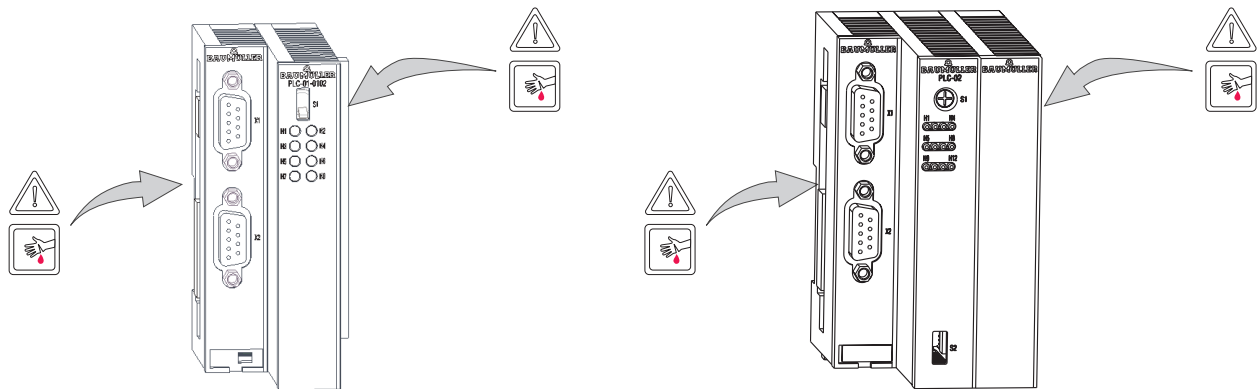


Figure 5: Danger zones

4.5 Labeling of the controller – type code

On the front panel, you will find the type code ("E" in [▶Figure 1◀](#) on page 19 at BMC-M-PLC-01 and in [▶Figure 3◀](#) on page 21 at BMC-M-PLC-02) of the module.



NOTE

This type code applies only to b maXX controller PLC module. Other modules have their own type codes.

<u>BMC</u> - M - PLC - XX - YY - ZZ	Device generation in which you use the module
BMC - <u>M</u> - PLC - XX - YY - ZZ	Module
BMC - M - <u>PLC</u> - XX - YY - ZZ	Module type (b maXX controller PLC)
BMC - M - PLC - <u>XX</u> - YY - ZZ	Version module 01: 120 MHz 32-bit RISC-CPU version 02: 667 MHz 32-bit RISC-CPU version
BMC - M - PLC - XX - <u>YY</u> - ZZ	Version hardware 01: Standard version old (with 4 MB Flash-NOVRAM; no longer manufactured) 11: Standard version (with 4 MB Flash-NOVRAM; changed wrap connection between power supply, PLC and field bus modules)
BMC - M - PLC - XX - YY - <u>ZZ</u>	Version software 02: Standard version (operating system with Motion Control func- tions)

**NOTE**

All modules in hardware version „-1x-“ are **incompatible** to the modules in the hardware version „-0x-“, because wrap connections between power supply, PLC and possible field bus modules were changed. Only modules in hardware version „-1x-“ can be stuck together.

Example: b maXX controller PLC BMC-M-PLC-01-11-02 and
power supply for b maXX controller PLC BMC-M-PSB-01-10-00

This type code is located on the front of the module („E“ in [▶Figure 1◀](#) on page 19 at BMC-M-PLC-01 and in [▶Figure 3◀](#) on page 21 at BMC-M-PLC-02). The type code contains the module's basic data. For a list of all the technical data, refer to [▶Appendix D Technical Data◀](#) from page 79 onward.

4.5 Labeling of the controller – type code

5.2 Requirements of the personnel carrying out work



DANGER

The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The unit and the vicinity of the control cabinet may carry dangerous voltages.*

Before starting any work, ensure that the unit and its vicinity are free of voltage.

Observe the relevant safety regulations when handling current-carrying units.

Ensure that only qualified personnel assembles and installs this module.

Qualified personnel is considered to be people whose training, experience and knowledge of relevant standards and regulations, accident prevention regulations and conditions in the plant has led to their being authorized by the plant safety manager to carry out activities that are needed in each case while recognizing and avoiding any possible hazards that might arise. The qualifications that are necessary for working with the unit include, for example:

- Trained or instructed in accordance with recognized safety standards in the care and use of appropriate safety equipment

5.3 Preparing assembly

With the configuring documents of the system you can prepare the assembly. With the required installation space (see [►Installation space ◀](#) from page 29 onward) you determine the location of the 35 mm C profile (top-hat rail, see [►Appendix D - Technical Data◀](#) from page 79 onward) and determine the dimension for the fixing holes.



CAUTION

The following **may occur**, if you do not observe this caution information:

- minor to medium personal injury.

*The danger is: **Eye injury due to catapulting particles**. While executing the drillings and the cut-out metal particles are catapulted.*



wear eye protection

- Carry out the drillings and mount the 35 mm C profile

5.4 Installation space

The following drawings show you the height dimensions and the depth gauge of the modules of the b maXX system. Use these drawings in order to determine the required space in the control cabinet.

The module's width is variable. In order to determine the width of your b maXX system, you have got to add the width of the modules you want to use. If necessary, pay attention to the restrictions of the number of modules which can be used at one power supply unit.

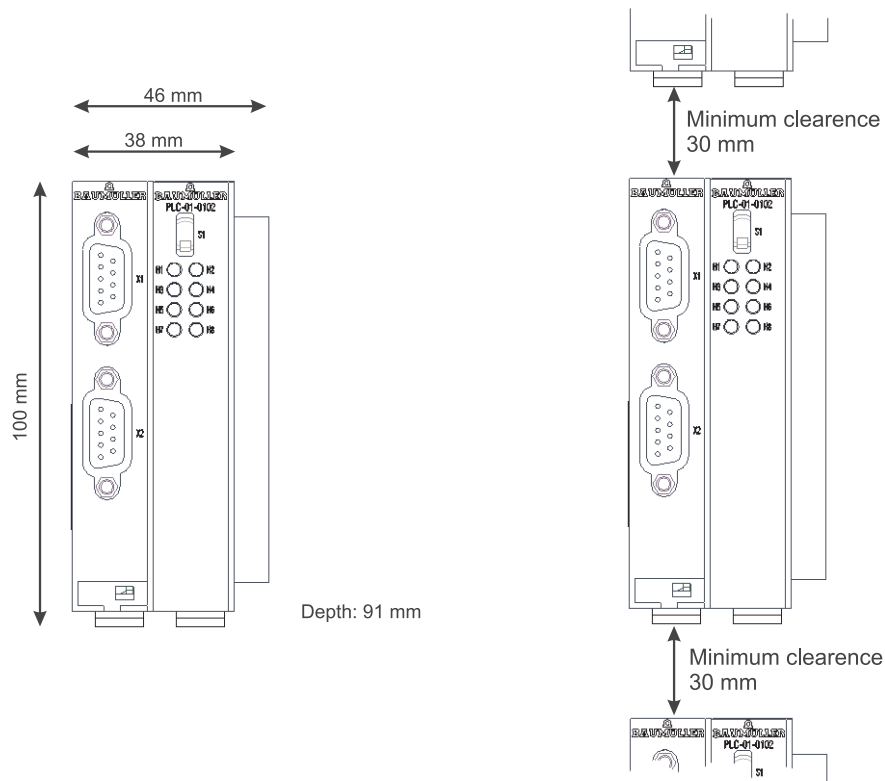


Figure 7: Installation space b maXX system

NOTE



The indicated distances are minimum clearances. Due to the cable routing this distances may be greater than the minimum (see [▶ Sequence of installation ◀](#) from page 37 onward).

5.5 Assembly instructions

Please note that the b maXX controller PLC can be assembled with the power supply unit only (and if necessary with other system components at b maXX controller PLC).

Therefore, for assembling keep ready the b maXX controller PLC, the power supply unit and if necessary other system components.



DANGER

The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

*Danger from: **electricity**. The unit and the vicinity of the control cabinet may carry dangerous voltages.*

Before starting any work, ensure that the unit and its vicinity are free of voltage. Observe the relevant safety regulations when handling current-carrying units.

The following materials are needed:

- Suitable tools for opening the spring energy clamp of the electrical terminal (2-mm wide screwdriver)
- Suitable tools for pulling out the white grip at the bottom of the module (e.g. pointed electronic pliers)

- Consult the type code (see "E" in [▶Figure 8](#) at BMC-M-PLC-01 and in [▶Figure 9](#) on page 31 at BMC-M-PLC-02) to ensure that you have the correct module.

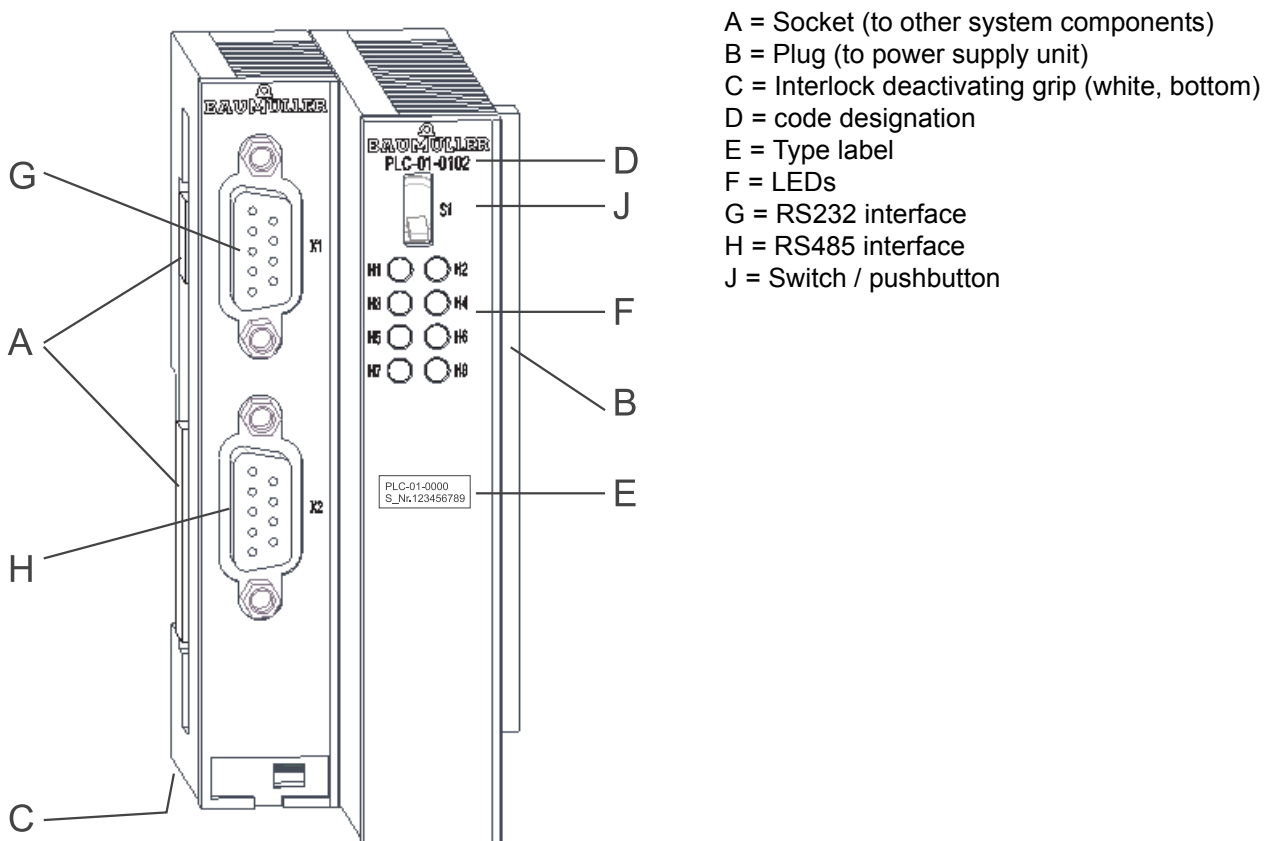
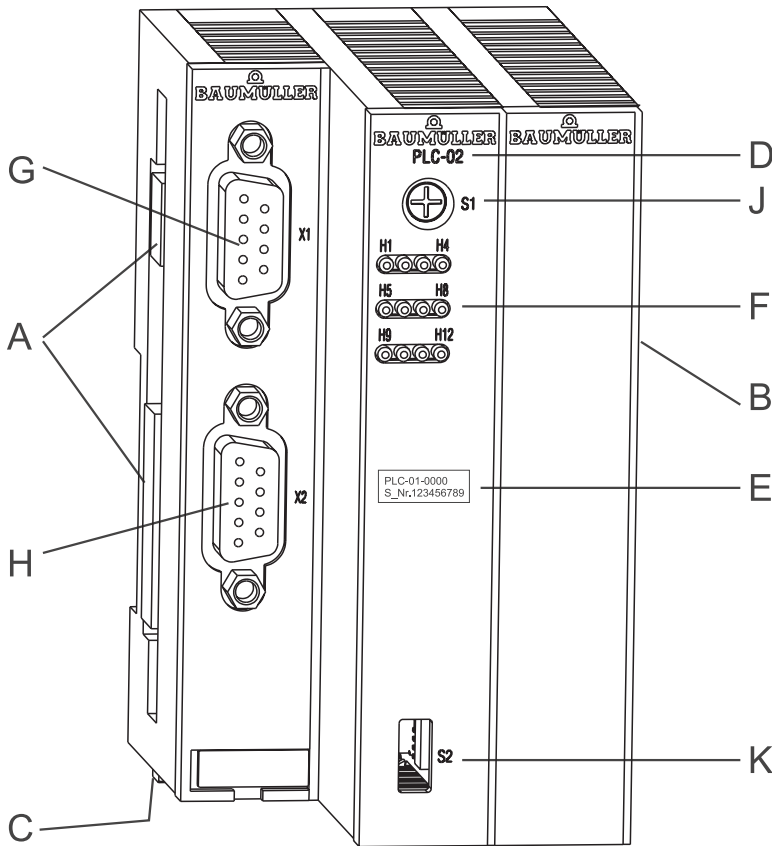


Figure 8: b maXX controller PLC-01



- A = Socket (to other system components)
- B = Plug (to power supply unit)
- C = Interlock deactivating grip (white, bottom)
- D = code designation
- E = Type label
- F = LEDs
- G = RS232 interface
- H = RS485 interface
- J = Rotary switch
- K = Switch / pushbutton

Figure 9: b maXX controller PLC-02

- 1 Switch off the power supply unit for b maXX controller PLC and secure it from being unintentionally restarted during assembly. If necessary dismantle already connected cables.
- 2 Open the control cabinet.
- 3 Stick the b maXX controller PLC together with the power supply unit.

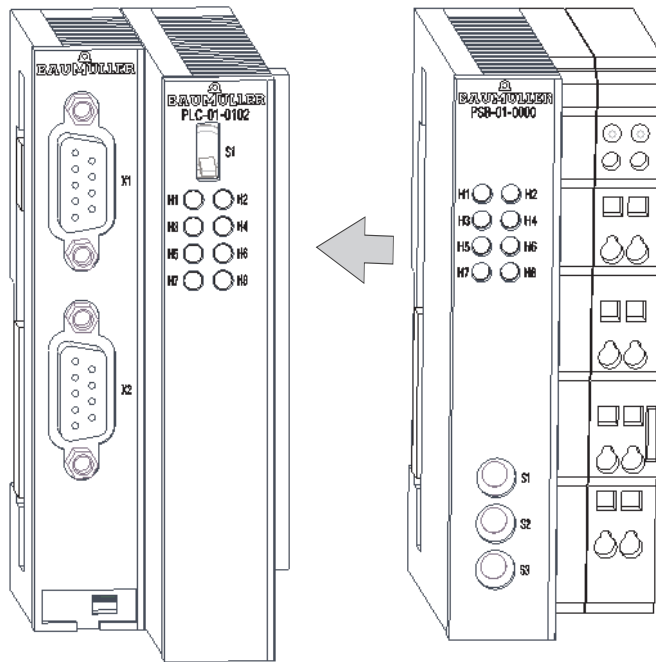


Figure 10: b maXX controller PLC-01 with power supply unit

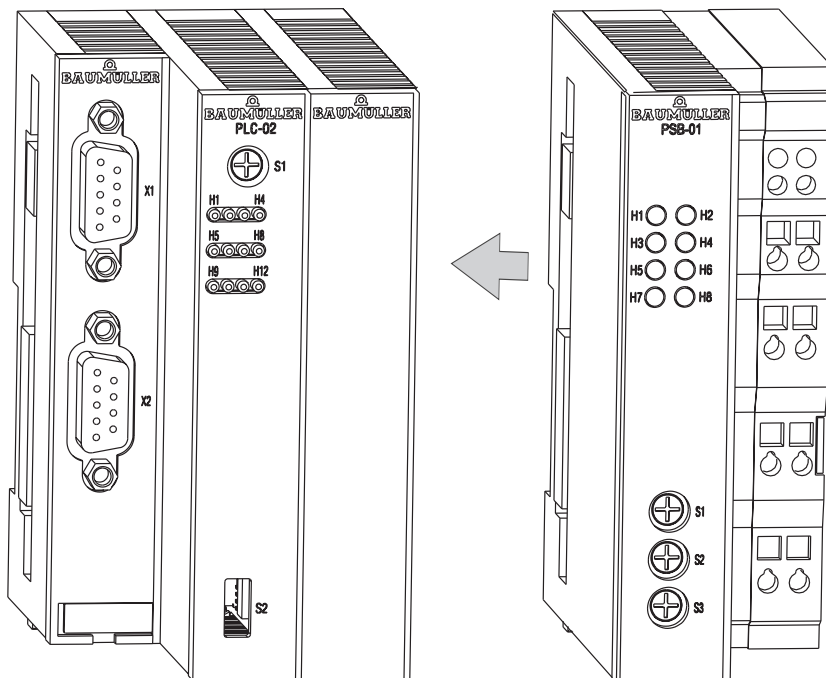


Figure 11: b maXX controller PLC-02 with power supply unit

If necessary mount more system components for the b maXX controller PLC on the left hand of the b maXX controller PLC.



NOTE

If you don't plug the b maXX controller PLC to the power supply unit, the b maXX system does not function.

- 4 On the left hand of the bottom of the power supply unit a white grip is located. Pull this grip towards the bottom and then pull forward. The grip engages. Repeat this step at the b maXX controller PLC (two grips at BMC-M-PLC-01, three grips at BMC-M-PLC-02).
If necessary repeat this step at other system components for the b maXX controller PLC (which have been put to the left hand of the b maXX controller PLC).

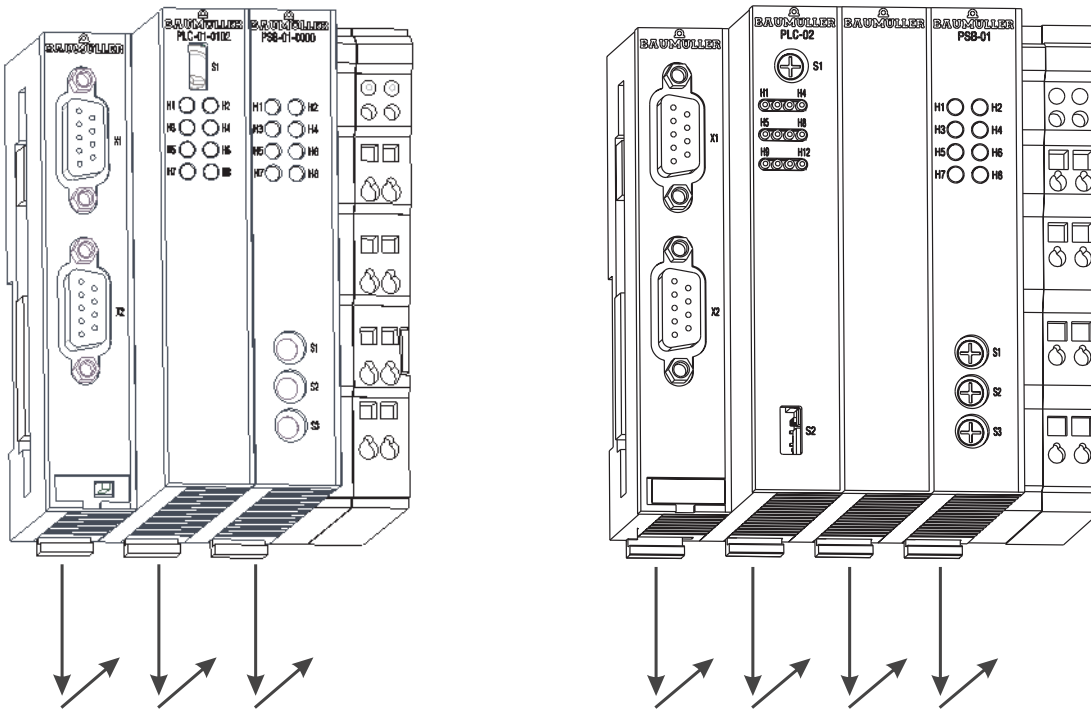


Figure 12: b maXX controller PLC with power supply unit

- 5 With a little screwdriver pull the orange grip on the right hand of the power supply unit forward so that the grip can be seized in a good manner.

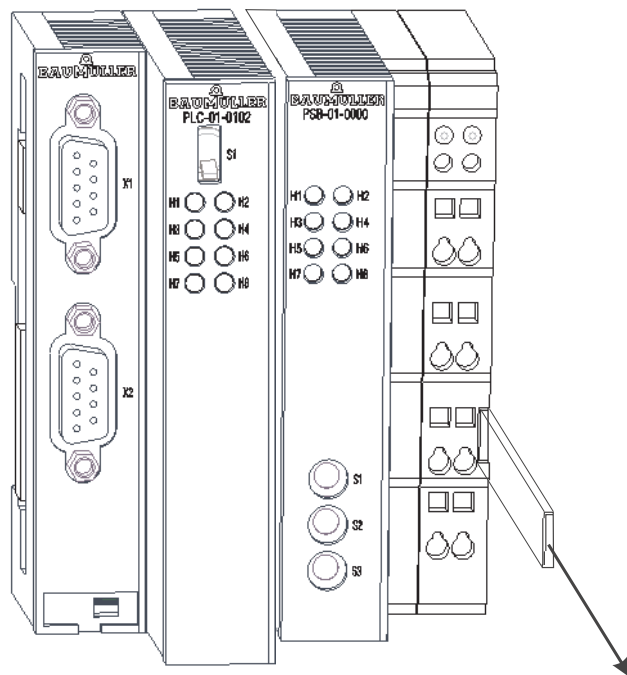


Abbildung 13: b maXX controller PLC-01 (left hand) with power supply unit (right hand)

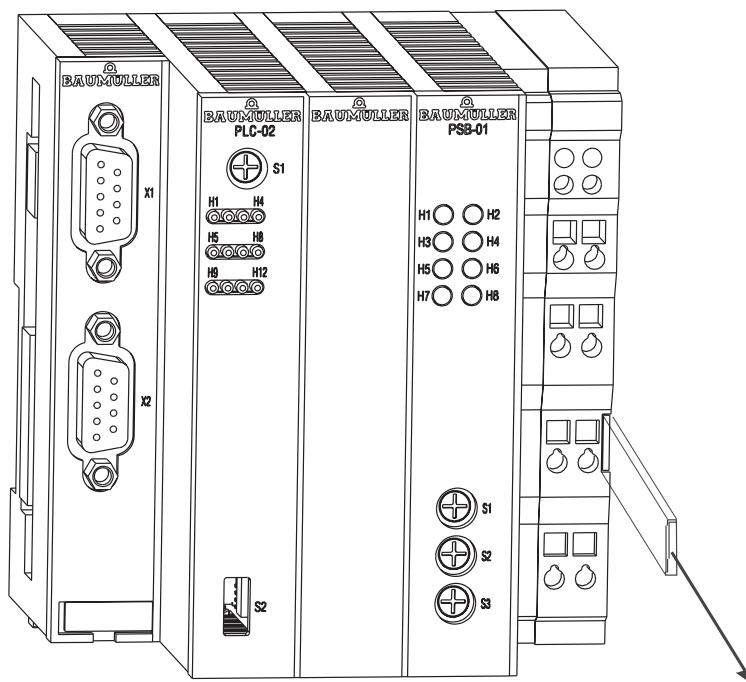


Abbildung 14: b maXX controller PLC-02 (left hand) with power supply unit (right hand)

- 6 Now plug the module block in the 35 mm C profile and hold onto it.
- 7 Pull the orange grip on the right hand of power supply unit forward and press at the same time the module block backwards.

- 8** Unhand the orange grip. The right part of the power supply unit engages on the 35 mm C profile.
- 9** Shift the orange grip into the module. Thus an inadvertently breaking of the grip is prevented.
- 10** Press the white grip at the bottom of the left part of the power supply backwards. Thus the white grip jumps out and the left part of the power supply engages on the 35 mm C profile.
Repeat this step with the b maXX controller PLC (two grips at BMC-M-PLC-01, three grips at BMC-M-PLC-02). Thus the b maXX controller PLC engages on the 35 mm C profile.
If necessary repeat this step with other system components for b maXX controller PLC (placed on the left hand of the b maXX controller PLC). Thus the other system components engage on the 35 mm C profile.
- 11** Now you can mount other system components (e.g. I/O-modules) on the right hand of the power supply unit. Observe to the according operation instructions.

This completes assembly of the b maXX controller PLC module. Connecting lines and commissioning is shown in the following sections.

5.6 Installation

At installation, carry out cabling of the b maXX controller PLC module.

5.6.1 Connection diagram

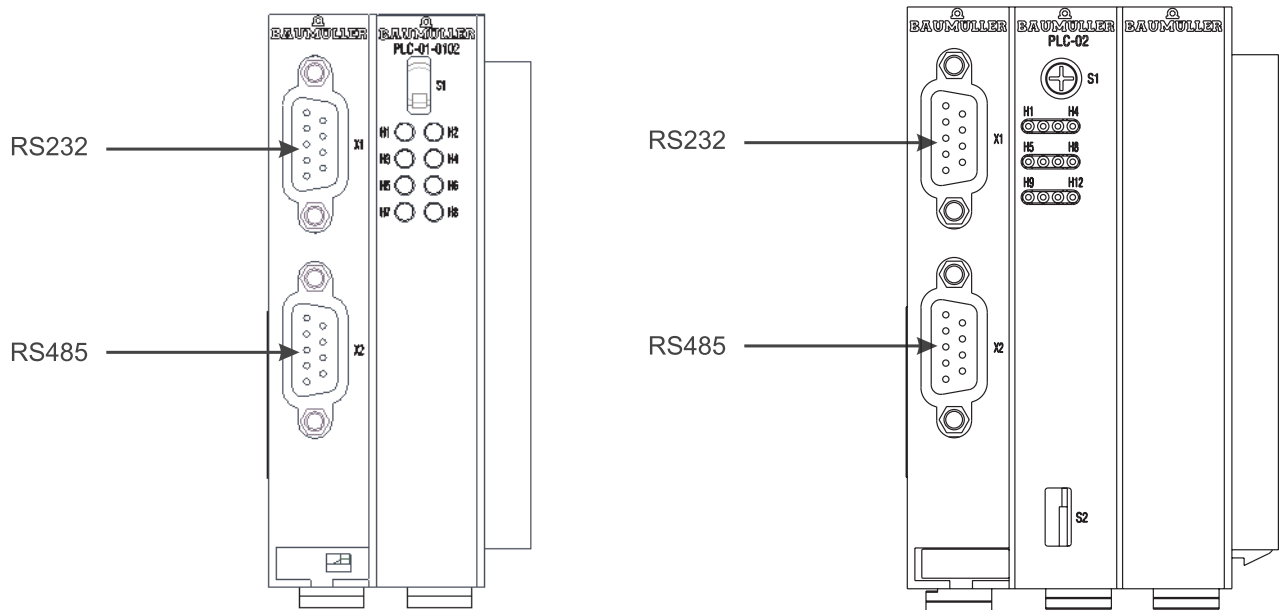


Figure 15: Connection diagram of b maXX controller PLC module

5.6.2 Requirements of electrical connection



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

Danger from: electrical voltage. *If you are not able to ensure the module's requirements of the electrical connection, the plug-in module can be damaged or destroyed.*

Ensure that you comply with the connection values that are specified in the technical data and that the connections were made in accordance with the stipulations.

Prevent short-circuits between inputs/outputs. In the case of a short-circuit between inputs/outputs, the plug-in module can be destroyed.

The +5 V at Pin 2 of the Sub-D socket on the b controller maXX module is intended only to supply external Baumüller-specific RS485/RS232 converters; you must not short-circuit or ring connect it with others.

To be able to comply with Standard EN 60 204-1 (Electrical Equipment of Machines), you must use the cables that are suggested in the standard. The connectors must not drop; otherwise, there is a risk of short-circuits or external voltages, etc.

- Ensure EMC-appropriate laying of the connection cables.

5.6.3 Requirements of the connection cable

Baumüller has released the following cables for use:

You must use twisted pair cables with a cross-section surface area of a maximum of 0.5 mm²; sheath PVC and sheathing of galvanized woven copper.

Example: Type LIYCY 6 x 2 x 0.14 mm²

For more information, refer to [►Appendix B - Accessories◄](#) from page 73 onward.



NOTE

Use 60°/75° copper cables, if you consider UL 508 C.

5.6.4 Sequence of installation

- ▶ Ensure that the b maXX system is deenergized
- ▶ Ensure that the external power supply unit is switched off and protected against re-start.
- ▶ Connect the 9-pin SUB-D socket X1 on the left hand front panel of the b maXX controller PLC module to the PROPROG programming cable (see [►Requirements of the connection cable◄](#) on page 37 and [►Appendix D - Technical Data◄](#) from page 79 onward).
- ▶ Connect the 9-pin SUB-D socket X2 on the left hand front panel of the b maXX controller PLC module to the connection cable for a terminal or an other device with RS485 interface (see [►Requirements of the connection cable◄](#) on page 37 and [►Appendix D - Technical Data◄](#) from page 79 onward).

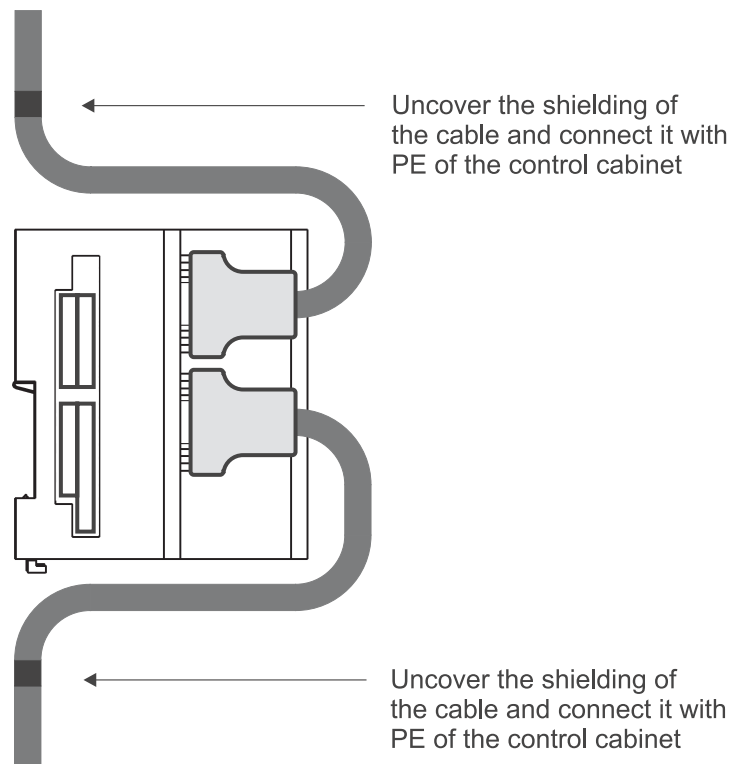


Figure 16: Cable routing

- Lay the connecting lines as stipulated in ►[Figure 16](#)◀. First the shielding of the cable must be uncovered. The length of the uncovered shielding should correspond to the width of the cable clamp. The cable is fastened with the clamp so that the shielding and the PE of the control cabinet are connected electrically.

This completes installation.

COMMISSIONING

In this chapter, we will describe how you commission the b maXX controller PLC module that you just assembled and installed (see [▶Assembly and installation ◀](#) from page 27 onward). Commissioning ensures that the b maXX controller PLC module functions correctly.

Before starting commissioning, ensure that the following conditions have been met:

- 1 The module has been assembled correctly.
- 2 The module has been installed correctly.
- 3 All the safety equipment has been commissioned.
- 4 The b maXX system is ready for use.

6.1 General safety regulations

- ▶ Observe the [▶Basic Safety Instructions ◀](#) from page 7 onward.

DANGER

The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

Danger from: **mechanical effects**. *At commissioning, parts of the machine/system or the complete machine/system can move.*

Keep far enough the moving parts of the machine/system. Note that from the connected (to the b maXX controller PLC) other modules machine parts can be set in motion. In all cases, activate the machine's safety devices.



6.2 Requirements of the personnel carrying out work

Commissioning work must only be carried out by trained specialists who have understood the safety regulations and information and can implement them.

6.3 Description/inspection of the safety and monitoring systems

Before you commission the b maXX controller PLC module, you must ensure that the 24 V power supply is connected correctly to the power supply unit for b maXX controller PLC and that the power supply is in accordance with the specifications. Not until you have checked and ensured this, you may continue commissioning.

Consider during commissioning that the b maXX controller PLC can be commissioned only together with the power supply unit and if necessary other system components.

6.4 Description and inspection of the controls and displays

6.4.1 LEDs for displaying operating status conditions of BMC-M-PLC-01

The b maXX controller PLC module has eight LEDs (four green ones (H1, H3, H5, H7) and four red ones (H2, H4, H6, H8)) as display elements (see „F“ in [▶Figure 1](#) on page 19).

These LEDs are used by the operating system of the b maXX controller PLC during initialisation.

The operator can use the LEDs in the application program on the b maXX controller PLC module during operation (after the start-up phase of the operating system)

All system components of the b maXX system must have reached a specific internal operating status (global ready message) after switching in the supply voltage before they may be actuated by the b maXX controller PLC

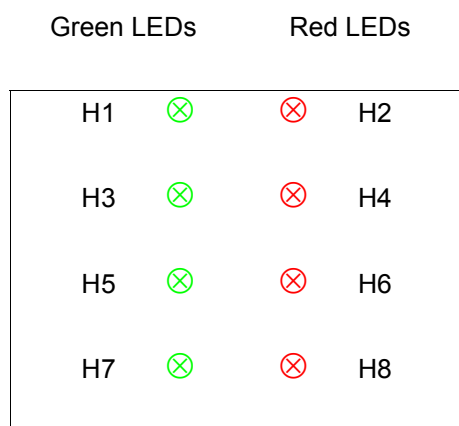


Figure 17: LEDs of the b maXX controller PLC module (BMC-M-PLC-01)

6.4.1.1 Switching on and initialisation of BMC-M-PLC-01

- After switching on the b maXX controller PLC module waits for the global ready message of the following modules:
 - Power supply unit for b maXX controller PLC
 - Modules plugged in left handed from the controller PLC (e.g. Ethernet with CANopen-Master module)

This stage is indicated by a counterclockwise-rotating bit pattern. This means that an LED lights up every 500 ms in the sequence H1 (green) → H3 (green) → H4 (red) → H2 (red) → H1 (green) etc.

If the global ready message of the modules is not issued within max. 8 s, LED H6 (red) is switched on.

To remove the cause of errors see [▶ Troubleshooting and eliminating errors ◀](#) from page 53 onward.

- After the global ready message of the modules the b maXX controller PLC initializes the I/O-bus.

This stage is indicated by a clockwise-rotating LED pattern. This means that a LED lights up every 500 ms in the sequence H1 (green) → H2 (red) → H4 (red) → H3 (green) → H1 (green) etc.

If the I/O-bus cannot be initialized within 8 s or an error occurs at I/O-bus initialization, LED H8 (red) is switched on.

The two sequences that we have just described can be completed very quickly, which means that you do not necessarily have to observe the associated operating displays.

After this, a PC and the b maXX controller PLC module can, in principle, carry out PRO-PROG communication via the serial RS232 port X1.

From now on, PROPROG communication is also possible by means of TCP/IP if a module with Ethernet functionality (e.g. Ethernet with CANopen-Master module) is placed on the left hand of the b maXX controller PLC and has been configured for communication with the b maXX controller PLC module.

- If a boot project is present, the system now loads it. The top two LEDs (H2 and H1) flash rapidly to show that the boot project is being loaded.

NOTE



If the global ready message of the modules fails (H6 (red) is switched on) **no** user program can run. A PLC error message is generated. The PLC remains in status „STOP“.

At the end of the start-up phase, the LEDs show the following PLC-specific operating status conditions:

- No project available, status "POWER ON":
→ LEDs H3 (green) and H4 (red) light up.
- Project available, status "STOP":
→ Only LED H4 (red) lights up.
- Project available, status "INIT", the controller is at the cold boot or warm restart stage:
→ Only LED H3 (green) lights up.
- Project available, status "RUN":
→ LEDs H1 (green) and H3 (green) light up.
- Global ready message fails:
→ LED H6 (red) lights up, PLC does **not** go in status „RUN“.

6.4 Description and inspection of the controls and displays

- I/O bus cannot be initialised:
→ LED H8 (red) lights up.



NOTE

If the I/O-bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

I.e. you could use the b maXX controller PLC and the other modules without the I/O-bus modules.

6.4.1.2 Operation of BMC-M-PLC-01

At the end of the start-up phase, the LEDs show the following PLC-specific operating status conditions:

- No project available, status "POWER ON":
→ LEDs H3 (green) and H4 (red) light up.
- Project available, status "STOP":
→ Only LED H4 (red) lights up.
- Project available, status "INIT", the controller is at the cold boot or warm restart stage:
→ Only LED H3 (green) lights up.
- Project available, status "RUN":
→ LEDs H1 (green) and H3 (green) light up.
- Global ready message fails:
→ LED H6 (red) lights up, PLC does **not** go in status „RUN“.
- I/O bus cannot be initialised:
→ LED H8 (red) lights up.

In the "RUN" status, users can freely program the eight LEDs. For information on programming, see the b maXX controller PLC Application Manual in the chapter entitled "b maXX controller PLC Board Functions / Function Block LED8".



NOTE

If the I/O-bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

I.e. you could use the b maXX controller PLC and the other modules without the I/O-bus modules.

6.4.2 S1 switch/pushbutton for changing operating status conditions

For changing the operating status' there is a switch/pushbutton on the b maXX controller PLC module („J“ in [▶Figure 1◀](#) on page 19).

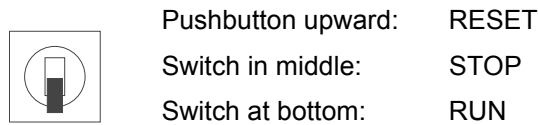


Figure 18: Switch S1 on the b maXX controller PLC-01 module (BMC-M-PLC-01)

NOTE



The user project can only start when switch/pushbutton S1 is in the bottom "RUN" position and all modules have sent their global ready message to the b maXX controller PLC (H6 (red) is switched off).

The pushbutton upward resets the „b maXX controller PLC module“, the „power supply unit for b maXX controller PLC“ and the other system components (i.e. modules on left hand of the b maXX controller PLC and on right hand of the power supply unit).

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

Danger from: **mechanical effects**. *At commissioning of the b maXX controller PLC and of the connected power supply unit (and other connected system components) with a complete application program can be started the machine/system or parts of the machine/system. Due to a wrong address on the power supply unit (see ▶Operating Instructions Power Supply Unit for b maXX controller PLC ◀) the machine/system or parts of the machine/system can behave unexpectedly.*

Keep far enough the moving parts of the machine/system. Note that from the (to the b maXX controller PLC) other modules which are connected, machine parts can be set in motion. In all cases, activate the machine's safety devices.

6.4.3 LEDs for displaying operating status conditions of BMC-M-PLC-02

The b maXX controller PLC module has twelve LEDs (five green ones (H1, H3, H5, H7, H11), five red ones (H2, H4, H6, H8, H10), one blue (H9) and one orange/green (H12)) as display elements (see „F“ in ▶Figure 3◀ on page 21).

These LEDs are used by the operating system of the b maXX controller PLC during initialisation.

The operator can use the LEDs in the application program on the b maXX controller PLC module during operation (after the start-up phase of the operating system)

All system components of the b maXX system must have reached a specific internal operating status (global ready message) after switching in the supply voltage before they may be actuated by the b maXX controller PLC

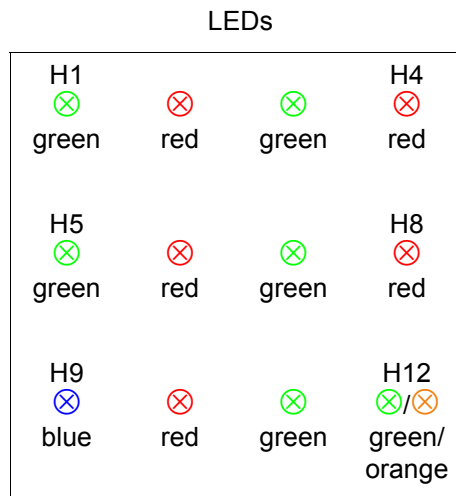


Figure 19: LEDs of the b maXX controller PLC module (BMC-M-PLC-02)

6.4.3.1 Switching on and initialisation of BMC-M-PLC-02

- After switching on a basis initialization of the b maXX controller PLC module is carried out, which is required for further initialization. At the end of the basis initialization H9 (blue) is switched on.
- Afterwards the b maXX controller PLC module waits for the global ready message of the following modules:
 - Power supply unit for b maXX controller PLC
 - Modules plugged in left handed from the controller PLC (e.g. Ethernet with CANopen-Master module)

This stage is indicated by a counterclockwise-rotating bit pattern. This means that an LED lights up every 500 ms in the sequence H1 (green) → H5 (green) → H6 (red) → H2 (red) → H1 (green) etc. H9 (blue) is switched off.

If the global ready message of the modules is not issued within max. 8 s, LED H4 (red) is switched on.

To remove the cause of errors see [▶ Troubleshooting and eliminating errors ◀](#) from page 53 onward.

- After the global ready message of the modules the b maXX controller PLC initializes the I/O-bus.

This stage is indicated by a clockwise-rotating LED pattern. This means that a LED lights up every 500 ms in the sequence H1 (green) → H2 (red) → H6 (red) → H5 (green) → H1 (green) etc.

If the I/O-bus cannot be initialized within 8 s or an error occurs at I/O-bus initialization, LED H8 (red) is switched on.

The two sequences that we have just described can be completed very quickly, which means that you do not necessarily have to observe the associated operating displays.

After this, a PC and the b maXX controller PLC module can, in principle, carry out PRO-PROG communication via the serial RS232 port X1.

From now on, PROPROG communication is also possible by means of TCP/IP if a module with Ethernet functionality (e.g. Ethernet with CANopen-Master module) is placed on the left hand of the b maXX controller PLC and has been configured for communication with the b maXX controller PLC module.

- If a boot project is present, the system now loads it. The two LEDs (H1 and H2) flash rapidly to show that the boot project is being loaded.

**NOTE**

If the global ready message of the modules fails (H4 (red) is switched on) **no** user program can run. A PLC error message is generated. The PLC remains in status „STOP“.

At the end of the start-up phase, the LEDs show the following PLC-specific operating status conditions:

- No project available, status "POWER ON":
→ LEDs H5 (green) and H6 (red) light up.
- Project available, status "STOP":
→ Only LED H6 (red) lights up.
- Project available, status "INIT", the controller is at the cold boot or warm restart stage:
→ Only LED H5 (green) lights up.
- Project available, status "RUN":
→ LEDs H1 (green) and H5 (green) light up.
- Global ready message fails:
→ LED H4 (red) lights up, PLC does **not** go in status „RUN“.
- I/O bus cannot be initialised:
→ LED H8 (red) lights up.

**NOTE**

If the I/O-bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

I.e. you could use the b maXX controller PLC and the other modules without the I/O-bus modules.

6.4.3.2 Operation of BMC-M-PLC-02

At the end of the start-up phase, the LEDs show the following PLC-specific operating status conditions:

- No project available, status "POWER ON":
→ LEDs H5 (green) and H6 (red) light up.
- Project available, status "STOP":
→ Only LED H6 (red) lights up.
- Project available, status "INIT", the controller is at the cold boot or warm restart stage:
→ Only LED H5 (green) lights up.

6.4 Description and inspection of the controls and displays

- Project available, status "RUN":
→ LEDs H1 (green) and H5 (green) light up.
- Global ready message fails:
→ LED H4 (red) lights up, PLC does **not** go in status „RUN“.
- I/O bus cannot be initialised:
→ LED H8 (red) lights up.

In the "RUN" status, users can freely program the twelve LEDs. For information on programming, see the b maXX controller PLC Application Manual in the chapter entitled "b maXX controller PLC Board Functions / Function Block LED12".



NOTE

If the I/O-bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

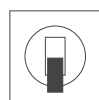
I.e. you could use the b maXX controller PLC and the other modules without the I/O-bus modules.

6.4.4 Rotary switch S1 of BMC-M-PLC-02

The rotary switch S1 of BMC-M-PLC-02 is provided for future developments and is not used now.

6.4.5 S2 switch/pushbutton for changing operating status conditions of BMC-M-PLC-02

For changing the operating status' there is a switch/pushbutton on the b maXX controller PLC module („K“ in [▶Figure 3◀](#) on page 21).



Pushbutton upward:	RESET
Switch in middle:	STOP
Switch at bottom:	RUN

Figure 20: Switch S2 on the b maXX controller PLC module (BMC-M-PLC-02)



NOTE

The user project can only start when switch/pushbutton S2 is in the bottom "RUN" position and all modules have sent their global ready message to the b maXX controller PLC (H4 (red) is switched off).

The pushbutton upward resets the „b maXX controller PLC module“, the „power supply unit for b maXX controller PLC“ and the other system components (i.e. modules on left hand of the b maXX controller PLC and on right hand of the power supply unit).

**DANGER**

The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

Danger from: **mechanical effects**. *At commissioning of the b maXX controller PLC and of the connected power supply unit (and other connected system components) with a complete application program can be started the machine/system or parts of the machine/system. Due to a wrong address on the power supply unit (see ▶Operating Instructions Power Supply Unit for b maXX controller PLC ◀) the machine/system or parts of the machine/system can behave unexpectedly.*

Keep far enough the moving parts of the machine/system. Note that from the (to the b maXX controller PLC) other modules which are connected, machine parts can be set in motion. In all cases, activate the machine's safety devices.

6.5 Commissioning sequence

Commissioning is divided into the following procedures:

- 1 Activation.
- 2 Testing the function.

6.5.1 Activation of BMC-M-PLC-01

- Read and observe the ▶General safety regulations ◀ from page 39 onward.
- You must have carried out correctly section "Assembly and Installation".
- Set switch/pushbutton S1 on the b maXX controller PLC module to "STOP" (center position).
- Switch on the 24 V DC of the power supply unit.

**NOTE**

You must not connect the b maXX controller PLC module with other system components or disconnect them, if the 24 V DC power supply is switched on. Switch the 24 V DC power supply off first.

6.5.2 Testing the function of BMC-M-PLC-01

- After you switch on the b maXX system, two status conditions can apply:
 - No boot project (= no user project on the b maXX controller PLC): LED H2 (red) lights up briefly after a short time, the LEDs H3 (green) and H4 (red) are permanently lit up. This means that no project is present on the b maXX controller PLC. In this "POWER ON" status, the b maXX controller PLC is waiting for PRO-PROG communication.

- Boot project present:
When you switch on, the system loads the boot project. When you do this, the top LEDs flash. After a short time, LED H4 (red) lights up. The b maXX controller PLC is in the "STOP" status.
- While switch/pushbutton S1 on the b maXX controller PLC module is set to "STOP" (centre position), an existing boot project cannot start up.
If you want to start an existing boot project by setting switch S1 on the b maXX controller PLC module to the "RUN" (bottom) position, **first** ensure that you have loaded the **correct** boot project for your application for **this** plant in **this** b maXX controller PLC and the correct address is preset at the power supply unit!

Refer to the b maXX controller PLC Application Manual for more information on how to ensure that this is the case or how you can send a boot project to the b maXX controller PLC, for example.

DANGER



The following **will occur**, if you do not observe this danger information:

- serious personal injury
- death

Danger from: **mechanical effects**. *At commissioning of the b maXX controller PLC and of the connected power supply unit (and other connected system components) with a complete application program can be started the machine/system or parts of the machine/system. Due to a wrong address on the power supply unit (see ▶Operating Instructions Power Supply Unit for b maXX controller PLC ◀) the machine/system or parts of the machine/system can behave unexpectedly.*

Keep far enough the moving parts of the machine/system. Note that from the (to the b maXX controller PLC) other modules which are connected, machine parts can be set in motion. In all cases, activate the machine's safety devices.

6.5.3 Activation of BMC-M-PLC-02

- Read and observe the ▶[General safety regulations](#) ◀ from page 39 onward.
- You must have carried out correctly section "Assembly and Installation".
- Set switch/pushbutton S2 on the b maXX controller PLC module to "STOP" (center position).
- Switch on the 24 V DC of the power supply unit.

NOTE



You must not connect the b maXX controller PLC module with other system components or disconnect them, if the 24 V DC power supply is switched on. Switch the 24 V DC power supply off first.

6.5.4 Testing the function of BMC-M-PLC-02

- After you switch on the b maXX system, two status conditions can apply:

- No boot project (= no user project on the b maXX controller PLC):
LED H2 (red) lights up briefly after a short time, the LEDs H5 (green) and H6 (red) are permanently lit up.
This means that no project is present on the b maXX controller PLC.
In this "POWER ON" status, the b maXX controller PLC is waiting for PROPROG communication.
- Boot project present:
When you switch on, the system loads the boot project. When you do this, the top LEDs flash. After a short time, LED H6 (red) lights up. The b maXX controller PLC is in the "STOP" status.
- While switch/pushbutton S2 on the b maXX controller PLC module is set to "STOP" (centre position), an existing boot project cannot start up.
If you want to start an existing boot project by setting switch S2 on the b maXX controller PLC module to the "RUN" (bottom) position, **first** ensure that you have loaded the **correct** boot project for your application for **this** plant in **this** b maXX controller PLC and the correct address is preset at the power supply unit!

Refer to the b maXX controller PLC Application Manual for more information on how to ensure that this is the case or how you can send a boot project to the b maXX controller PLC, for example.

7

OPERATION

For guides to operating the b maXX controller PLC module (BMC-M-PLC-01), refer to the b maXX controller PLC Application Manual and the PROPROG wt II Programming Manual.

For guides to operating the b maXX controller PLC module (BMC-M-PLC-02), refer to the b maXX controller PLC Application Manual and the ProProg wt III Online Help System.

For guides to operating the power supply unit for b maXX controller PLC, refer to the Operating Instructions power supply unit for b maXX controller PLC (BMC-M-PSB-01).

For guides to operating the system components connected to the b maXX controller PLC, refer to the respective Operating Instructions and Application Manuals.



TROUBLESHOOTING AND ELIMINATING ERRORS

In this chapter, we will describe fault indications of the b maXX controller PLC module, the meanings of these indications and how you can respond to them.

8.1 Safety regulations

Observe the relevant safety regulations, see [►Basic Safety Instructions ◀](#) from page 7 onward.

8.2 Requirements of the personnel carrying out work

The personnel who work with the b maXX system, must have been instructed in operating the unit and be familiar with correctly operating it. Responding to error displays and status conditions in particular requires special knowledge that operators must demonstrate. Below, we will inform you about the various disturbances and the error messages that result from them. These disturbances can have mechanical or electrical causes.

8.3 Troubleshooting at BMC-M-PLC-01

The b maXX controller PLC module signals errors via LEDs H6 (red) and H8 (red). In the „RUN“ status of the b maXX controller PLC module users can freely program the LEDs.

Observe that the following error description does not apply if the user has programmed the LEDs in his user application project.

H6 (red) on

The b maXX controller PLC module didn't get the global ready message from the following modules (see [►Switching on and initialisation of BMC-M-PLC-01 ◀](#) from page 40 onward):

- Modul power supply unit for b maXX controller PLC
- Modules which are plugged on the left hand of the b maXX controller PLC (e.g. Ethernet with CANopen-Master modul)

This can be due to the following reason:

- A module is faulty or there is a connection error of a module
 - Does the error also occur if only the b maXX controller PLC and the power supply unit are used?

You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
 - Yes Check whether there are bent pins between the b maXX controller PLC and the power supply unit

Replace the b maXX controller PLC module or the power supply unit, if necessary.
 - No Assemble successively the other modules and their connections until you have determined the faulty module

H8 (red) on The b maXX controller PLC module couldn't initialize the I/O-bus.



NOTE

If the I/O bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

I.e. you could use the b maXX controller PLC and the other modules without the I/O bus modules.

An unsuccessful I/O-bus initialization can be due to the following reason:

- A module is faulty or there is a connection error of a module (e.g. I/O-module), which is plugged on right hand of the power supply unit.
 - Does the error also occur if only the b maXX controller PLC, the power supply unit and an end-module are used?

You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
 - Yes Replace the end-module, if necessary,

Check whether there are bent pins between the b maXX controller PLC and the power supply unit. Replace the b maXX controller PLC or the power supply unit, if necessary,
 - No Assemble successively the other modules and their connections until you have determined the faulty module
 - Are the I/O-modules and an end-module plugged on?

You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
 - No Assemble successively the other modules and their connections until you have determined the faulty module

If you want to use the b maXX controller PLC and the other modules without I/O-bus modules, this LED has no meaning for you.

- Yes Check whether there are bent pins between the b maXX controller PLC and the power supply unit.
- Replace the b maXX controller PLC module or the power supply unit, if necessary.

H2 (red) and H4 (red) on The module can not address correctly the internal memory.
Replace the module.

H1 on, H2 and/or H3 and/or H4 blinking Pattern: 1 s on, 1 s off
The module detects faults when loading the FPGA.
Replace the module.

H1 off, H2 on, H3 and/or H4 blinking Pattern: 1 s on, 1 s off
The module detects faults when loading the FPGA.
Replace the module.

Refer for error messages of the modules to the respective Operating Instructions.

8.4 Troubleshooting at BMC-M-PLC-02

The b maXX controller PLC module signals errors via LEDs H4 (red) and H8 (red). In the „RUN“ status of the b maXX controller PLC module users can freely program the LEDs.

Observe that the following error description does not apply if the user has programmed the LEDs in his user application project.

H4 (red) on The b maXX controller PLC module didn't get the global ready message from the following modules (see [▶Switching on and initialisation of BMC-M-PLC-02](#) ◀ from page 44 onward):

- Modul power supply unit for b maXX controller PLC
- Modules which are plugged on the left hand of the b maXX controller PLC (e.g. Ethernet with CANopen-Master modul)

This can be due to the following reason:

- A module is faulty or there is a connection error of a module

- Does the error also occur if only the b maXX controller PLC and the power supply unit are used?
You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
- Yes Check whether there are bent pins between the b maXX controller PLC and the power supply unit
Replace the b maXX controller PLC module or the power supply unit, if necessary.
- No Assemble successively the other modules and their connections until you have determined the faulty module

H8 (red) on The b maXX controller PLC module couldn't initialize the I/O-bus.



NOTE

If the I/O bus initialization was not successful (H8 (red) is switched on), the boot project is loaded and the user program run.

I.e. you could use the b maXX controller PLC and the other modules without the I/O bus modules.

An unsuccessful I/O-bus initialization can be due to the following reason:

- A module is faulty or there is a connection error of a module (e.g. I/O-module), which is plugged on right hand of the power supply unit.
 - Does the error also occur if only the b maXX controller PLC, the power supply unit and an end-module are used
You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
 - Yes Replace the end-module, if necessary,
Check whether there are bent pins between the b maXX controller PLC and the power supply unit. Replace the b maXX controller PLC or the power supply unit, if necessary,
 - No Assemble successively the other modules and their connections until you have determined the faulty module
 - Are the I/O-modules and an end-module plugged on?
You must only plug in and remove the modules when they are deenergized. For assembly and dismantling see the respective Operating Instructions.
 - No Assemble successively the other modules and their connections until you have determined the faulty module
If you want to use the b maXX controller PLC and the other modules without I/O-bus modules, this LED has no meaning for you.
 - Yes Check whether there are bent pins between the b maXX controller PLC and the power supply unit.

Replace the b maXX controller PLC module or the power supply unit, if necessary.

H2 (red) and H6 (red) on The module can not address correctly the internal memory.
Replace the module.

H10 (blue) on, H9 (red) blinking Pattern: 1 s on, 1 s off
The module detects faults when loading the FPGA.
Replace the module.

Refer for error messages of the modules to the respective Operating Instructions.

9

MAINTENANCE

If you comply with the specified environmental operating conditions, see [▶Appendix D Technical Data](#) from page 79 onward), the b maXX controller PLC module is maintenance-free. If you find a defect in your b maXX controller PLC module or think that it is defective, contact Baumüller Nürnberg GmbH.



10

OVERHAUL

You cannot overhaul a defective b maXX controller PLC module; contact Baumüller Nürnberg GmbH to obtain a replacement unit.



DISMANTLING, STORAGE

In this chapter, we will describe how you decommission the b maXX controller PLC module and store it.

11.1 Safety regulations

- Observe the [►Basic Safety Instructions◄](#) from page 7 onward.



CAUTION

The following **may occur**, if you do not observe this caution information:

- property damage.

The danger is: **electrical destruction**. *The sub-assembly may get destroyed electrically if it is removed with the supply voltage on .*

Ensure that all the electrical connections have been deenergized and are secured against re-starting.

Before starting work on the electrical connections, use appropriate measuring equipment to ensure that the connections are dead.

Do not dismount the connections until you are certain that they are dead.



WARNING

The following **may occur**, if you do not observe this warning information:

- serious personal injury
- death

The danger is: **Uncontrollable characteristics of the machine/system**. *Removal of the module with switched on supply voltage can change the characteristics of the machine/system.*

Ensure that all the electrical connections have been deenergized and are secured against re-starting.

Before starting work on the electrical connections, use appropriate measuring equipment to ensure that the connections are dead.

Do not dismount the connections until you are certain that they are dead.

11.2 Requirements of the personnel carrying out work

The personnel that carries out dismantling must have the necessary knowledge and have been trained appropriately to carry out this work. Choose these persons such that they understand and can apply the safety instructions printed on the unit and parts of it and on the connections.

11.3 Dismantling

The personnel who carry out dismantling must meet the requirements above.

The b maXX controller PLC module is mounted with the power supply unit and if necessary other system components for b maXX controller PLC.

At dismantling first the b maXX controller PLC, the power supply unit and if necessary other system components for b maXX controller PLC were disconnected from the 35 mm C profile (and from the I/O-modules right hand for the power supply unit).

Afterwards the b maXX controller PLC module is disconnected from the power supply unit.

The following materials are needed:

- Suitable packing for the b maXX controller PLC module; if possible, use the original packaging material
- If necessary suitable packing for the power supply unit; if possible, use the original packaging material
- If necessary suitable packing for other system components for b maXX controller PLC; if possible, use the original packaging material

- Suitable tools for opening the spring energy clamp of the electrical terminal (2-mm wide screwdriver)
- Suitable tools for pulling out the white grip at the bottom of the module (e.g. pointed electronic pliers)

Carry out the dismantling in the following order:

- 1 Switching the unit free of voltage and securing it from unintended restarting
- 2 Open the control cabinet.
- 3 Remove the cables from the electrical connection.
Disconnect the spring-loaded terminal (e.g. with 2-mm wide screwdriver) and pull out the respective cable.
- 4 Remove the male connectors from the sockets of the b maXX controller PLC.
- 5 If necessary remove the cables of the other system components mounted on the b maXX controller PLC module (see the according Operating Instructions of these system components).
- 6 There is a white grip on the bottom of power supply unit. Pull the grip (e.g. with the pointed electronic pliers) first downwards and then forward.
The grip locks home.
Repeat this step with the b maXX controller PLC module (two grips at BMC-M-PLC-01,

three grips at BMC-M-PLC-02).

If necessary repeat this step with the other system components for b maXX controller PLC (placed on the left hand of the b maXX controller PLC)

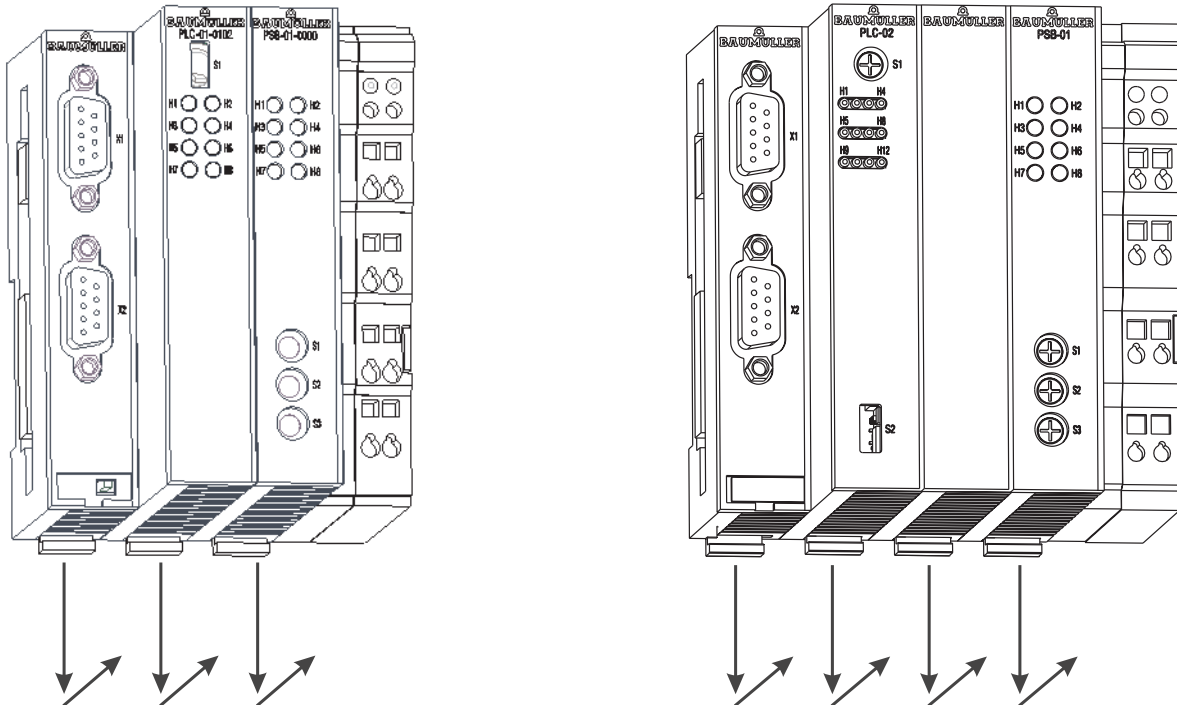


Figure 21: b maXX controller PLC module with power supply unit

- 7 Pull the orange grip (e.g. with a screwdriver) on the right hand of the power supply unit forward, so that you can take hold of the grip well.

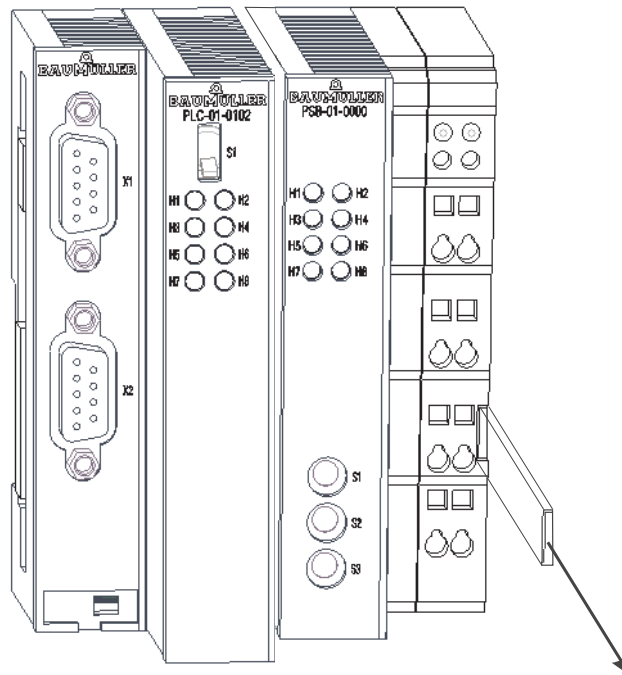


Figure 22: b maXX controller PLC (left) (BMC-M-PLC-01) with power supply unit (rights)

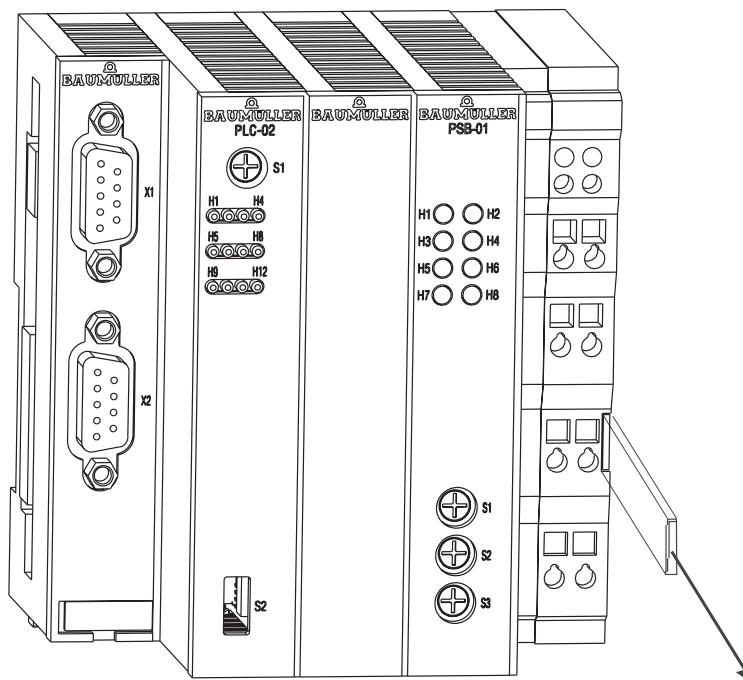


Figure 23: b maXX controller PLC (left) (BMC-M-PLC-02) with power supply unit (rights)

- 8 Pull (manually) the orange grip on the right hand of the power supply unit forward and afterwards pull the module block forward from the 35 mm C profile away.
The module block includes the power supply unit, the b maXX controller PLC and if necessary the other system components for b maXX controller PLC.

- 9 To disconnect the b maXX controller PLC module from the power supply unit press the extraction mechanism on the back of the b maXX controller PLC with the screwdriver. Insert the screwdriver horizontal in the slot and then press it bottom-up. Now pull the power supply unit out of the b maXX controller PLC module.
- 10 Place the b maXX controller PLC module in the prepared packaging.
If necessary place the power supply unit in the prepared packaging.
If necessary place the other system components in the respective prepared packaging.
- 11 If you want to change the b maXX controller PLC module, mount the new b maXX controller PLC now (see [►Assembly and installation◄](#) from page 27 onward).
- 12 Document the dismantling activities carried out (or replacement) of the b maXX controller PLC module.
If necessary document the dismantling activities carried out (or replacement) of the power supply unit for b maXX controller PLC.
If necessary document the dismantling activities carried out (or replacement) of the other system components.

If you changed the b maXX controller PLC module, switch the b maXX system now on.

If you want to dispose of the b maXX controller PLC module, refer to chapter [►Disposal◄](#) from page 69 onward for more information.

11.4 Storage conditions

Store the b maXX controller PLC module in suitable packaging according to the storage conditions in [►Technical Data◄](#) from page 79 onward.

11.5 Recommissioning

If you want to recommission the b maXX controller PLC module, observe the information in "Storage Conditions". Then, carry out [►Commissioning◄](#) from page 39 onward again.

12

DISPOSAL

In this chapter we will describe how you can correctly and safely dispose of the b maXX controller PLC module. Most of the waste is electronic scrap.

- The condition for dismantling has already been met, see [►Dismantling, storage ◄](#) from page 63 onward.

12.1 Safety regulations

You must only carry out disposal in accordance with the safety regulations. If necessary, you must also comply with any local regulations. If you cannot safely dispose of the unit yourself, commission a suitable disposal company to carry it out on your behalf.

12.2 Requirements of the personnel carrying out work

The personnel that carries out disposal/dismantling must have the necessary knowledge and have been trained appropriately to carry out this work. Choose these persons such that they understand and can apply the safety instructions printed on the b maXX system and parts of it.

12.3 Disposal guide

Conditions	<ul style="list-style-type: none">• The b maXX controller PLC module has already been correctly dismantled.• All the necessary technical aids for dismantling are ready for use and are in perfect technical condition.
Sheet steel	The front panel is made of galvanized sheet steel. Dispose of the sheet steel in your local reusable ferrous metal system.
Electronic scrap	You must dispose of the electronic scrap (PCB) that cannot be further dismantled as special waste. When doing this, observe the applicable regulations.
Plastic material	The housing consists of plastic. Dispose of the plastic housing in your local reusable plastic system.

12.4 Disposal locations/official bodies

Ensure that you carry out disposal in accordance with your company's guidelines and with the regulations of the responsible disposal locations and official bodies. If in doubt, contact the Trade Supervisory Authority that is responsible for your company or the Environmental Protection Authorities.



APPENDIX A ABBREVIATIONS

CAN	Controller Area Network
CPU	Central Processing Unit
DRAM	Dynamic RAM
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electrostatic sensitive device
EXT, ext	External
I/O-bus	Bus between b maXX controller PLC and the modules right handed of the PLC or power supply unit
LED	Light Emitting Diode
NOVRAM	Non-volatile RAM
OPC	OLE for Process Control (OLE: Object Linking and Embedding)
PLC	Process loop control, Speicher programmierbare Steuerung, SPS
PROPROG wt II	Programming tool for the b maXX controller PLC (BMC-M-PLC-01)
ProProg wt III	Programming tool for the b maXX controller PLC (BMC-M-PLC-01 and BMC-M-PLC-02)
RAM	Random access memory
RISC	Reduced Instruction Set Computers
SDRAM	Synchronized Dynamic RAM
SW	Software



APPENDIX B ACCESSORIES

In this appendix, you will find a list of all the accessories that are available for Baumüller Nürnberg GmbH's b maXX controller PLC module.

If you have any queries about accessories or suggestions for improvements, Baumüller's Product Management will be pleased to hear from you.

B.1 List of all accessories

B.1.1 Programming cable (serial RS.232)

Line type: K-SS-01-xx (9-pin Sub-D, 9-pin Sub-D):

Type	Length [m]	Article Number
K-SS-01-03	3	213 846
K-SS-01-05	5	213 283
K-SS-01-15	15	231 086

B.1.2 Cable for linking HMIs (annunciators, touch screen, etc.) to the RS485 interface

Since the pin assignment of an RS485 interface is not standardized, Baumüller cannot offer a tailor-made cable.

You must use a twisted pair cable with a cross-section surface area of a maximum of 0.5 mm²; sheath PVC and sheathing of galvanized woven copper.

If necessary, you must contact the total screening with the metallic male or female cable connectors.

Example: Type LIYCY 6 x 2 x 0.14 mm²

For the pin assignment, see [▶D.3 Pin assignment Sub-D socket RS485 port◀](#) from page 81 onward



APPENDIX C MANUFACTURER DECLARATION

In this section we provide general information about EU directives, the CE symbol and the Declaration by Manufacturer.

C.1 What is an EU directive?

EU directives specify requirements. The directives are written by the relevant bodies within the EU and are implemented by all the member countries of the EU in national law. In this way the EU directives guarantee free trade within the EU.

An EU directive only contains essential minimum requirements. You will find detailed requirements in standards, to which references are made in the directive.

C.2 What the CE symbol indicates

a) The CE marking symbolizes conformity to all the obligations incumbent on manufacturers for the product by virtue of the Community directives providing for its affixing.

...

b) The CE marking affixed to industrial products symbolizes the fact that the natural or legal person having affixed or been responsible for the affixing of the said marking has verified that the product conforms to all the Community total harmonization provisions which apply to it and has been the subject of the appropriate conformity evaluation procedures.

...

Council Decision 93/465/EEC, Annex I B. a) + c)

We affix the CE mark to the equipment and to the documentation as soon as we have established that we have satisfied the requirements of the relevant directives.

All converters and control systems supplied by the Baumüller Nürnberg GmbH satisfy the requirements of 73/23/EEC (Low Voltage Directive).

As all converters and control systems comply with the requirements of the harmonized

standards EN50178, EN 60204-1, EN 60529 and HD625.1 S1, the protection targets of 73/23/EWG are reached.

With specified application of this Baumüller equipment in your machinery, you can act on the assumption that the equipment satisfies the requirements of 98/37/EG (machinery directive). Therefore the equipment is developed and constructed in such a way, that the requirements of the harmonized standard EN 60204-1 can be met by the electrical installation.

Compliance with 89/336/EEC (EMC Directive) depends on how the equipment is installed. Since you are performing installation yourself, it is you who are responsible for complying with 89/336/EEC.

A declaration of conformity on the EMC directive therefore cannot be issued.

We will provide you with support in the form of EMC information. You will find this information in the operating manual and in "filters for main applications". When you have complied with all the requirements we impose in this documentation, you can assume that the drive satisfies the requirements of the EMC Directive.

The limit values and requirements for variable-speed electrical drives are determined in the harmonized product standard EN61800-3. If you are erecting an installation, for which a declaration of conformity on the EMC directive must be generated, it may be necessary to specify several harmonized standards, which you have used for the compliance of the protection targets of the directive. The harmonized product standard EN 61800-3 has to be used with electrical drives.

To enable you to market your machine within the EU, you must be in possession of the following:

- Conformity mark (CE mark)
- Declaration(s) of Conformity regarding the directive(s) relevant to the machine

C.3 Definition of the term Declaration by Manufacturer

A Declaration by Manufacturer as defined by this documentation is a declaration that the machine/safety component brought into circulation conforms to all the relevant fundamental safety and health requirements.

By issuing the Declaration of Conformity in this section the Baumüller Nürnberg GmbH declares that the equipment conforms to the relevant fundamental safety and health requirements resulting from the directives and standards which are listed in the Declaration of Conformity .

The Baumüller equipment is integrated into a machine. For health and safety, of the users for example, it is important for the entire machine to conform to all the relevant fundamental safety and health requirements. For this reason the Baumüller Nürnberg GmbH draws attention in the Declaration by Manufacturer to the fact that it is prohibited to put the machine as a whole into operation before it has been declared that the machine conforms to the provisions of the Machinery Directive.



C.4 Manufacturer Declaration

EG-Herstellererklärung

Declaration by Manufacturer

gemäß EG-Richtlinie 98/37/EG (Maschinen) vom 22.06.1998

geändert durch: 98/79/EG vom 27.10.1998

in accordance with EC directive 98/37/EG (machinery) dated 22.06.1998

changed by: 98/79/EC dated 27.10.1998

Modul b maXX controller PLC BMC-M-PLC-01/-02

Das obige Gerät wurde entwickelt und konstruiert sowie anschließend gefertigt in Übereinstimmung mit o. g. EG-Richtlinie und u. g. Normen in alleiniger Verantwortung von:

The unit specified above was developed and constructed as well as manufactured in accordance with the above mentioned directive and the standards mentioned below under liability of:

Baumüller Nürnberg GmbH, Ostendstr. 80 - 90, D- 90482 Nürnberg

Berücksichtigte Normen - standards complied with:

Norm / standard

EN 60204-1	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen Safety of machinery - Electrical equipment of machines
------------	---

Die Inbetriebnahme der Maschine, in die dieses Gerät eingebaut wird, ist untersagt bis die Konformität der Maschine mit der obengenannten Richtlinie erklärt ist.

The machinery into which this unit is to be incorporated must not be put into service until the machinery has been declared in conformity with the provisions of the directive mentioned above.

Nürnberg, 26. Juni 2006

Andreas Baumüller
Geschäftsführer
Head Division

N.N.
Entwicklungsleiter
Head of development

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APPENDIX D TECHNICAL DATA

In this appendix, you will find the technical data for Baumüller Nürnberg GmbH's b maXX controller PLC module.

D.1 Connection values

D.1.1 BMC-M-PLC-01 connection values

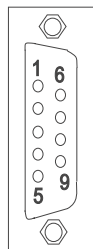
Processor	SH3
Clock frequency	120 MHz
Power supply	+5 V DC internal
Current input	350 mA
Ambient conditions	0°C ... 55°C 95% relative humidity, no condensation
Storage conditions	-25°C ... 85°C 95% relative humidity, no condensation
Transport conditions	-25°C ... 85°C 95% relative humidity, no condensation
Protection class	IP 20
Vibration / shock resistance	according to EN 60068-2-6 / EN 60068-2-27, EN 60068-2-29
EMC resistance burst / ESD	according to EN 61000-6-2 / EN 61000-6-4
Dimensions (W x H x D)	38 mm x 100 mm x 91 mm (Width: 46 mm at assembly)
Weight	approx. 170 g
Assembly	on 35 mm C mounting rail according to EN 50022 (named top-hat rail)

D.2 Pin assignment Sub-D socket RS232 port

D.1.2 BMC-M-PLC-02 connection values

Processor	ARM
Clock frequency	667MHz
Power supply	+5 V DC internal
Current input	1000 mA
Electrical isolation	720 V DC
Ambient conditions	0°C ... 55°C 95% relative humidity, no condensation
Storage conditions	-25°C ... 85°C 95% relative humidity, no condensation
Transport conditions	-25°C ... 85°C 95% relative humidity, no condensation
Protection class	IP 20
Vibration / shock resistance	according to EN 60068-2-6 / EN 60068-2-27, EN 60068-2-29
EMC resistance burst / ESD	according to EN 61000-6-2 / EN 61000-6-4
Dimensions (W x H x D)	57 mm x 100 mm x 91 mm (Width: 65 mm at assembly)
Weight	approx. 250 g
Assembly	on 35 mm C mounting rail according to EN 50022 (named top-hat rail)

D.2 Pin assignment Sub-D socket RS232 port



9-pin SUB-D female connector

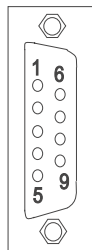
Pin No.	Assignment
1	Not assigned
2	TxD (Transmit Data)
3	RxD (Receive Data)
4	Connected to Pin 6
5	GND (Signal Ground)
6	Connected to Pin 4
7	CTS (Clear to Send)
8	RTS (Request to Send)
9	Not assigned

NOTE



The signal grounds of the RS232 and RS485 ports are connected together.

D.3 Pin assignment Sub-D socket RS485 port



9-pin SUB-D female connector

Pin No.	Assignment
1	TxD- (Transmit Data negative)
2	VCC (+5V output for supplying external RS485/RS232 converters)
3	GND (Signal Ground RS232/RS485)
4	GND (Signal Ground RS232/RS485)
5	RxD- (Receive Data negative)
6	RxD+ (Receive Data positive)
7	GND (Signal Ground RS232/RS485)
8	GND (Signal Ground RS232/RS485)
9	TxD+ (Transmit Data positive)

NOTE



The signal grounds of the RS232 and RS485 ports are connected together.

CAUTION



The following **may occur**, if you do not observe this caution information:

- property damage.

Danger of: **electrical shortcircuit**. *An electrical shortcircuit can damage the unit.*

The +5 V at Pin 2 of the Sub-D socket X2 on the b maXX controller PLC module is intended only to supply external Baumüller-specific RS485/RS232 converters; you must not short-circuit or ring connect it with others.



Revision index

Revision level	State	Modifications
5.04014.02	18.10.2005	Chapter 4.5 Labeling of the controller – type code: wrap connections between power supply, PLC and field bus modules were changed (new hardware version BMC-M-PLC-01-11-02)
5.04014.03	14.02.2006	Chapter 5.4 Installation space Note inserted Chapter 5.6.4 Sequence of installation Cable routing changed
5.04014.04	16.10.2006	New: BMC-M-PLC-02



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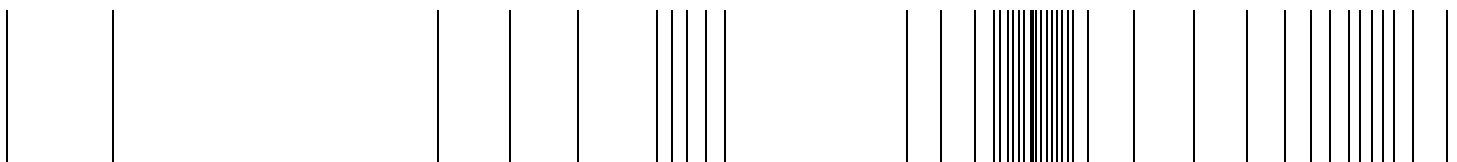
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be in motion



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